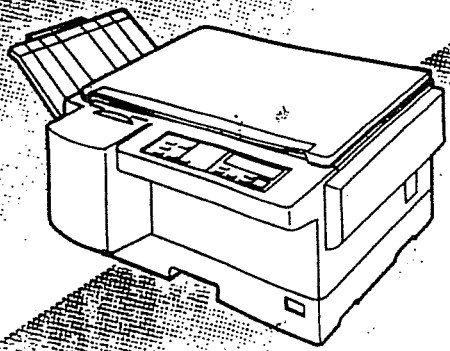
Service Manual

Plain Paper Copier

FP-7113



Panasonic

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FP-7113 Service Manual
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⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

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For Sweden, and Denmark

SPECIALSÄKRING: ENDAST AV APPARATFABRINKANTEN LEVERERAD SÄKRING FÅR ANVÄNDAS.

VARNING!
Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

ADVARSEL!
Lithiumbatteri—Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Lever det brugte batteri tilbage til leverrandoren.

CAUTION!
Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Section I
Introduction

1.1 Specifications

1. Type:	Desktop
2. Copy process:	Electrostatic photographic method
3. Development process:	Two-component magnetic brush
4. Maximum original size:	Ledger (11 in × 17 in)/A3 (297 m × 420 mm)
5. Copy speed:	Inch area 7 copies per minute : Ledger size 8 copies per minute : Legal size 13 copies per minute : Letter size 10 copies per minute : Letter R size 13 copies per minute : Invoice size Metric area 7 copies per minute : A3 size 8 copies per minute : B4/FLS size 13 copies per minute : A4 size 10 copies per minute : A4R size 13 copies per minute : A5 size
6. First copy time:	6.5 seconds : (Letter/A4 size) (without Auto ode) 11.5 seconds : (Letter/A4 size) (with Auto Mode)
7. Copy ratio:	Enlargement (fixed): Inch area: 1:1.41, 1:1.29, 1:1.21 Metric area: 1:1.41, 1:1.22, 1.15 Reduction (fixed): Inch area: 1:0.79, 1:0.77, 1:0.65 Metric area: 1:0.87, 1:0.82, 1:0.71 Zoom: 1.41–0.65 (1% step)
8. Copy size:	Inch area Ledger : (11 in × 17 in) Legal : (8 2/1 in × 14 in) Letter : (11 in × 8 2/1 in) Letter R : (8 2/1 in × 11 in) Invoice : (5 2/1 in × 8 2/1 in) Metric area A3 : (297 mm × 420 mm) B4 : (257 mm × 364 mm) Foolscap : (8.5" × 13"), (8" × 13") A4 : (297 mm × 210 mm) A4R : (210 mm × 297 mm) A5 : (148 mm × 210 mm)

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For U.K.

FOR YOUR SAFETY PLEASE READ THE FOLLOWING TEXT CAREFULLY.

This appliance is supplied with a moulded three pin mains plug for your safety and convenience. A 13 amp fuse is fitted in this plug.

Should the fuse need to be replaced please ensure that the replacement fuse has a rating of 13 amps and that it is approved by ASTA or BSI to BS1362.

Check for the ASTA mark ⓐ or the BSI mark ⓚ on the body of the fuse.

If the plug contains a removable fuse cover you must ensure that it is refitted when the fuse is replaced.

If you lose the fuse cover the plug must not be used until a replacement cover is obtained.

A replacement fuse cover can be purchased from your local Panasonic Dealer.

IF THE FITTED MOULDED PLUG IS UNSUITABLE FOR THE SOCKET OUTLET IN YOUR OFFICE THEN THE FUSE SHOULD BE REMOVED AND THE PLUG CUT OFF AND DISPOSED OF SAFELY.

THERE IS A DANGER OF SEVERE ELECTRICAL SHOCK IF THE CUT OFF PLUG IS INSERTED INTO ANY 13 AMP SOCKET.

If a new plug is to be fitted please observe the wiring code as shown below.

If in any doubt please consult a qualified electrician.

WARNING : THIS APPLIANCE MUST BE EARTHED.

IMPORTANT : The wires in this mains lead are coloured in accordance with the following code:

Green and Yellow	:Earth
Blue	:Neutral
Brown	:Live

As the colours of the wires in the main lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

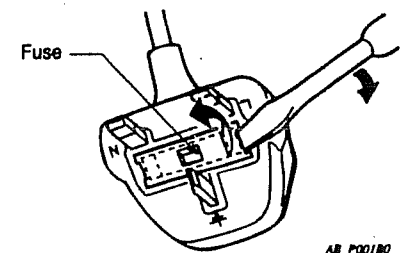
The wire which is coloured GREEN-AND-YELLOW must be connected to the terminal in the plug which is marked by letter E or by the safety EARTH symbol "⏚" or coloured GREEN or GREEN-AND-YELLOW.

The wire which is coloured BLUE must be connected to the terminal in the plug which is marked with the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal in the plug which is marked with the letter L or coloured RED.

How to replace the fuse.

Open the fuse compartment with a screwdriver and replace the fuse.



1.3 Operator controls/Indicators

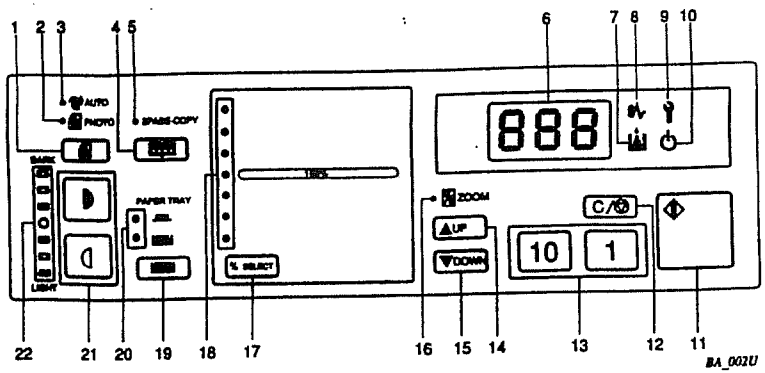


Figure 1-4-1

1. PHOTO/AUTO Mode key
When the copier is turned ON, it is automatically set to AUTO Mode. When this key is pressed, DOCUMENT Mode is selected. When this key is pressed again, PHOTO Mode is selected. When this key is pressed again, AUTO Mode is selected.

2. PHOTO Indicator
This indicator lights in PHOTO Mode.

3. AUTO Indicator
This indicator lights in AUTO Mode.

4. 2-PAGE COPY key
When this key is pressed, a ledger/A3 original can be copied on 2 separate letter/A4 pages (right and left).

5. 2-PAGE COPY Indicator
When the 2-PAGE COPY key is pressed, this indicator lights.

6. DIGIT display
This display can show the number of copies to be made, COPY RATIO, SERVICE MODE, JAM CODE and MACHINE ERROR CODE. Normally this display indicates the number of copies to be made.

7. ADD TONER Indicator
When the amount of toner in the toner hopper drops below the required level, this indicator flashes.

8. PAPER JAM Indicator
This indicator lights when the copy paper is not fed correctly, and the copier automatically stops.

9. SERVICE CALL Indicator
When the number of copies is reached for preventive maintenance, this indicator will flash.

10. WAIT Indicator
This indicator lights during warm up. A copy cycle cannot be started when this indicator is ON.

11. PRINT key
When the PRINT key is pressed while the WAIT indicator is OFF, the copy cycle starts.

12. CLEAR/STOP key
During the copy operation, when the CLEAR/STOP key is pressed once, the number of copies remaining will appear in the DIGIT display and the copy operation stops. The copy operation can be restarted by pressing the PRINT key again at this time. When the CLEAR/STOP key is pressed again, the number of copies in the DIGIT display will reset to one. The copy operation is stopped and cleared.

13. MULTI-COPY key
Keys to select the number of copies to be made. Any number up to 99 can be selected.

14. ZOOM UP key
This key is pressed when making zoom copies, (Enlargement). When the UP key is pressed once, the copy ratio is increased by one percent. The copy ratio can be increased in 1% increments by continuosly pressing the UP key.

15. ZOOM DOWN key
This key is pressed when making zoom copies, (Reduction). When the DOWN key is pressed once, the copy ratio is reduced by one percent. The copy ratio can be reduced in 1% increments by continuosly pressing the DOWN key.

9. Paper capacity:	250 sheets paper tray (front loading) + 50 sheets multi-feed bypass	
10. Paper feed:	Push button automatic paper tray + sheet bypass	
11. Paper exit tray capacity:	100 sheets : (20 lb/80 g/m²: Legal/Letter/Invoice /B4/A4/A5 size)	
	50 sheets : (20 lb/80 g/m²: Ledger/A3 size)	
12. Paper weight:	16 to 24 lb/60 to 90 g/m²	
13. Continuous copying:	1-99 automatic reset to 1	
14. Fusing system:	Heat and Pressure	
15. Photoreceptor:	Organic Photoconductor (OPC)	
16. Exposure control:	7 step digital + Photo/Auto button	
17. Warm up time:	Approximately 37 seconds	
18. Optical system:	Conventional internal scan	
19. Misfeed indication:	LED display	
20. Toner supply:	Automatic	
21. Power consumption:	Normal mode	: 100 Wh
	STANDBY mode	: 45 Wh
	Condensation prevention mode	: 15 Wh
	Power saving mode	: 9 Wh
22. Power source:	120V±10%, 12A, 60 Hz	
	220-240V±10%, 50 Hz	
23. Dimensions :	25.6 in × 23.9 in × 13.7 in	
(W) X (D) X (H)	650 × 608 × 347 mm	
24. Weight:	Approximately 72.6 lb/33 kg	
25. Ambient conditions:	Temperature : 50°F to 86°F/10°C to 30°C	
	Relative humidity : 30% to 80%	
	Noise = Standby	: 30 dB
	= Operation	: 45 dB
	Heat emission = Standby	: 130 Wh
	= Operation	: 660 Wh
	Ozone emission	: Less than 0.1 ppm
26. Accessories:	Exit tray	
	Document bag	
	Developer (except North American version)	

* Specifications are subject to change without notice.

1.2 Features

1. **This plain paper copier has been developed using new concepts.**
   - It has a new ergonomic design, which allows the copier to fit neatly in the office environment.

2. **Copy reservation function**
   - No more waiting for warm up; just position the original, enter your job instructions, and press the PRINT key. When warm up is completed, copying starts automatically.

3. **Power saving function (Service mode selection)**
   - To reduce power consumption, after the last copy is made, the power saving function is automatically turned on.

4. **Use of a front-loading mechanism.**
   - The space normally occupied by the plain paper copier has been reduced by installing the paper tray at the front of chassis.

5. **High reliability with improved serviceability.**
   - Due to an extensive pursuit of reliable performance and design concept that provides easier service, the replacement of preventive maintenance parts in each assembly has become simplified.
   - Before a failure occurs in the copier, the service mode can be used to indicate areas to be checked for servicing.
   - When a failure occurs in the copier, the self-diagnostics will indicate the area to be checked.
   - Paper jams can be easily removed from the copier. The sub-assembly design allows easy access to the copier interior and paper path.

6. **Easier operation.**
   - A dual-path paper feeding system, consisting of a paper tray (front-loading) and multi-sheet bypass.
   - The zoom function makes copies that range from 65% reduction to 141% enlargement of the original documents in 1% increments.
   - The Auto Mode provides high-contrast copies of original documents that have a colored background.
   - The Photo Mode clearly reproduces the halftones of photographs.

2. Electrical components

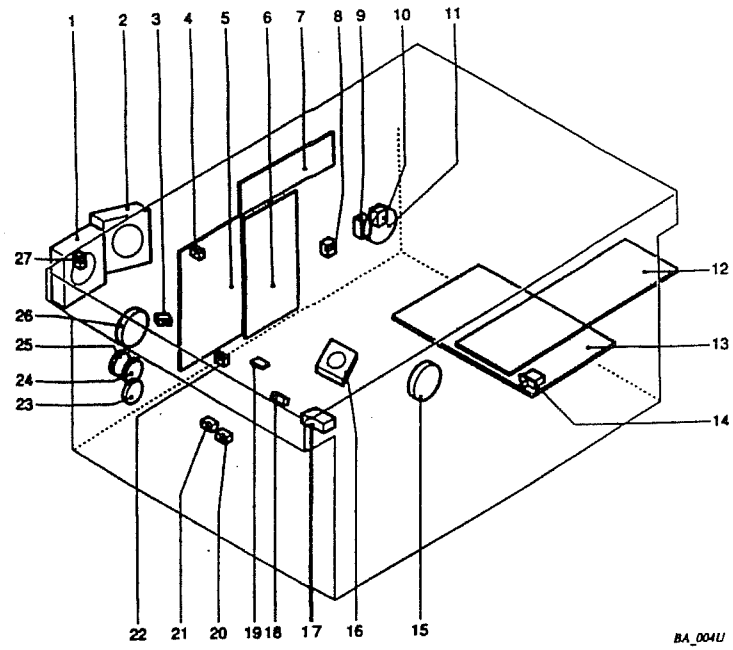


Figure 1-8-1

1. Fuser cooling fan
2. Optics cooling fan (A)
3. Blacking prevention film home position sensor
4. Half-speed unit home position sensor
5. High voltage power supply PCB
6. CPU PCB
7. Optics driver PCB
8. No.5/6 mirror unit home position sensor
9. Half-speed unit solenoid
10. Full-speed unit solenoid
11. Lamp unit scanner motor
12. Control panel PCB
13. Low voltage power supply PCB
14. Left cover switch
15. Toner supply/Blacking prevention film motor
16. Optics cooling fan (B)
17. Auto original density solenoid
18. Auto original density sensor
19. Toner density sensor (for Developer unit)
20. Timing roller sensor
21. Sheet bypass paper pass sensor
22. Paper exit sensor
23. Sheet bypass clutch
24. Paper feed roller clutch
25. Timing roller clutch
26. Main motor
27. Full-speed unit home position sensor

1.5 Copy Process

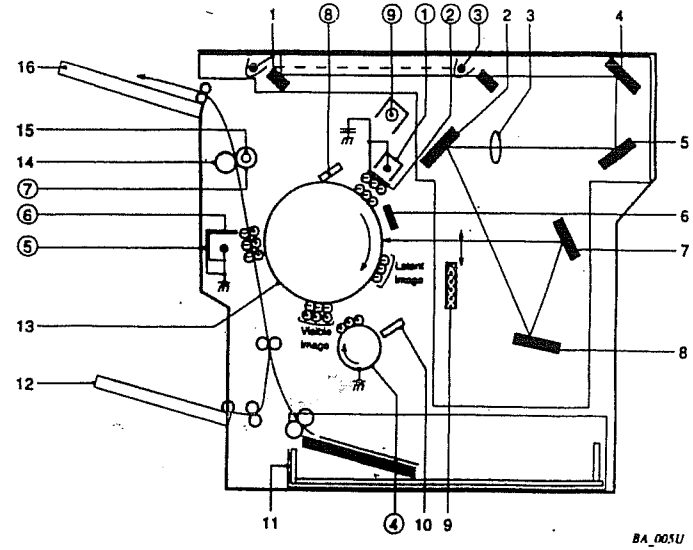


Figure 1-9-1

①	Charge corona	Approx. -4.6 kVDC	1	No.1 mirror	9	Auto original density sensor
②	Grid plate	Approx. -820 VDC	2	No.4 mirror	10	Doctor blade (BSD=0.65 mm)
③	Exposure lamp	—	3	Lens	11	Cassette
④	Magnetic roller (ø 20 mm)	Bias -250 VDC	4	No.2 mirror	12	Multi-sheet bypass
⑤	Transfer corona	Approx. -4.6 kVDC	5	No.3 mirror	13	Drum
⑥	Discharge saw	Approx. +2.9 kVDC	6	Blacking prevention film (for side erase)	14	Pressure roller
⑦	Heat roller	180°C	7	No.6 mirror	15	Fuser lamp
⑧	Cleaning blade	—	8	No.5 mirror	16	Paper exit tray
⑨	Discharge lamp	—				

16. ZOOM Indicator
When the ZOOM UP or DOWN key is pressed, this indicator lights.

17. COPY RATIO SELECT key
This key selects a 1:1, enlargement (fixed) or reduction (fixed) copy.

18. COPY RATIO SELECT indicator
When the COPY RATIO SELECT key is pressed, the selected copy ratio indicator lights.

19. PAPER TRAY key
This key is used to select a paper tray or the sheet bypass.

20. CASSETTE POSITION indicator
This indicator lights "Paper Tray" or "Sheet bypass" position.

21. EXPOSURE keys
Steps of copy density can be selected with 2 keys. When the LIGHT key is pressed, the copy density is varied in the direction of lightness. When the DARK key is pressed, the copy density is varied in the direction of darkness.

22. EXPOSURE indicator
When the copy density is manually selected using the exposure key, the corresponding LED lights according to the density selected. When the LIGHT key is pressed, the indicator moves down. When the DARK key is pressed, the indicator moves up.

1.4 Component location

1. Outer view

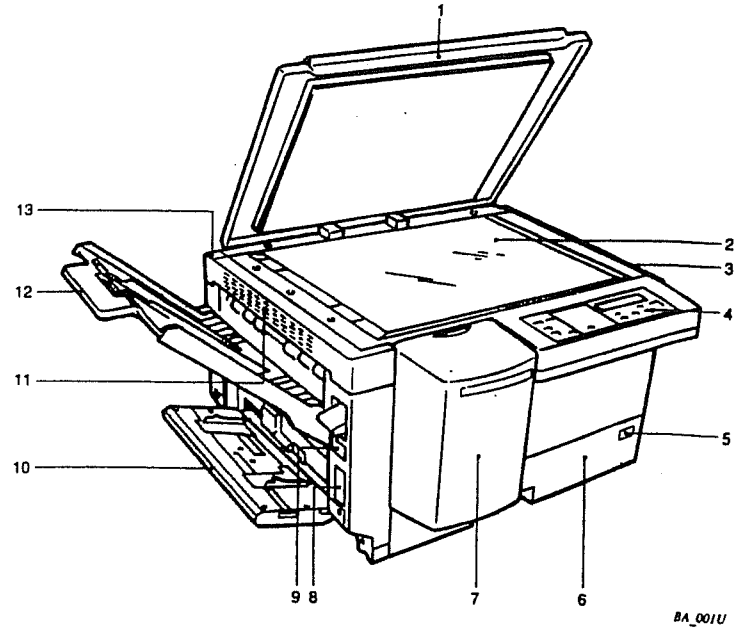


Figure 1-7-1

1. Platen cover
2. Platen glass
3. Right cover
4. Control panel
5. Paper size check window
6. Cassette
7. Toner hopper cover
8. Power switch
9. Release lever
10. Multi-sheet bypass
11. Left cover (upper)
12. Paper exit tray
13. Rear cover

Section II
Sub-Assemblies

2.1 Mechanical

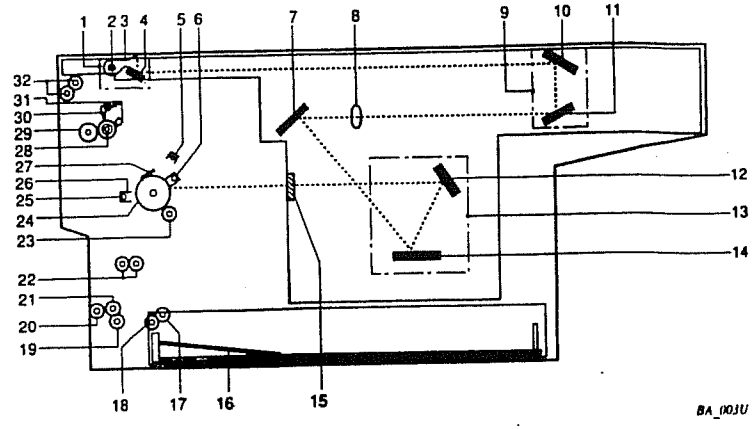


Figure 2-1-1

1. Full-speed unit
2. Exposure lamp
3. Aperture plate
4. No.1 mirror
5. Discharge lamp
6. Charge corona
7. No.4 mirror
8. Lens
9. Half-speed unit
10. No.2 mirror
11. No.3 mirror
12. No.6 mirror
13. No.5/6 mirror unit
14. No.5 mirror
15. Dust protection glass
16. Bottom plate
17. Paper feed roller
18. Double feed prevention roller
19. Sheet bypass double feed prevention roller
20. Paper transfer roller
21. Sheet bypass paper feed roller
22. Timing roller
23. Magnet roller
24. Drum
25. Transfer corna
26. Discharge saw
27. Cleaning blade
28. Heat roller
29. Pressure roller
30. Separation finger
31. Heat roller cleaner
32. Paper exit roller

2.2 Paper feed unit and Multi-sheet bypass

1. Paper tray loading/unloading operation

1) As the paper tray is gradually inserted, a protrusion on its far side pushes against the paper lifting arm. As a result, the paper lifting arm gear turns in the arrow direction.
2) The paper lifting arm gear and lifting gear rotate as the paper lifting arm rotates. The lifting spring pressure causes the lifting lever to raise the paper tray bottom plate, bringing the paper in contact with the paper feed roller.
3) As the paper tray is removed, the paper lifting arm rotates in the direction of the arrow. This causes the paper lifting arm gear and lifting gear to rotate in the reverse direction. The lifting lever lowers, causing the paper tray bottom plate to lower.

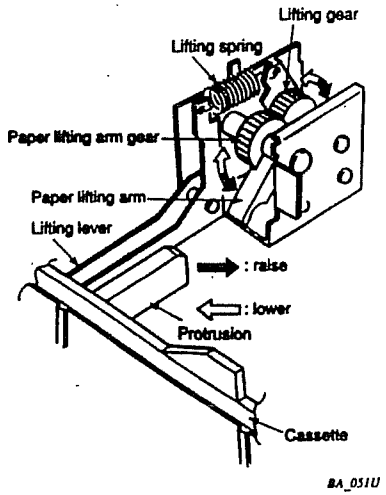


Figure 2-2-1

4) Normally, after the completion of a copy operation, a sheet of paper remains at the paper feed roller. If the paper tray is removed from the copier, the paper in the paper tray may be wrinkled or torn. The paper tray performs the following operation to prevent paper from remaining in the copier.
   - The double feed prevention roller (The roller mounted on the cassette) is lowered to separate it from the paper feed roller.
   - When removing the paper tray, the paper feed roller moves slightly, allowing the tray to be removed without wrinkling or tearing the paper.

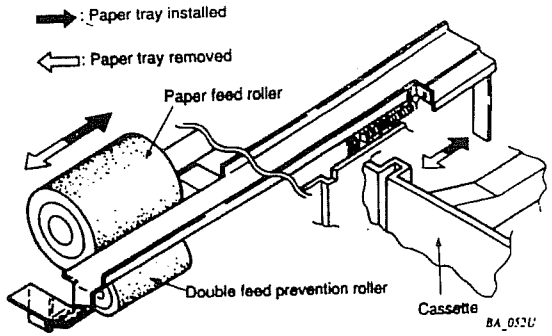


Figure 2-3-1

2. Paper feed sequence when the paper feed paper tray is selected.

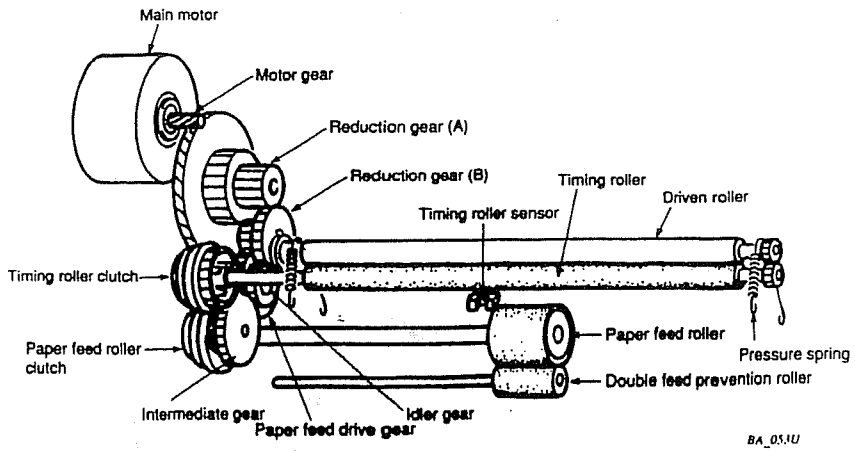


Figure 2-4-1

1) When the PRINT key is pressed, the rotation of main motor is transmitted to reduction gear (B) through reduction gear (A). The rotation of reduction gear (B) is then transmitted to a paper feed drive gear which drives the paper feed roller clutch gear.
2) The rotation of reduction gear (B) is then transmitted to a idler gear and intermediate gear which drives the timing roller clutch gear.
3) At the same time, the paper feed roller clutch turns ON, and the paper feed roller starts rotating, feeding the paper from the paper tray to the timing roller.
   Note: In the event of paper double feed, the double feed prevention roller (The roller mounted on the cassette) starts rotating in the clockwise direction to stop the lower sheet of paper from feeding. The feeding torque is determined by the torque limiter.
4) Near the timing roller is a timing roller sensor which checks the paper feed status. For a predetermined time, the paper feed roller clutch turns OFF and the paper remains in contact with the timing roller.
   - If the timing roller sensor does not detect the arrival of paper within a predetermined time, "P" (ADD PAPER) is displayed, and the copier stops.
5) Next, as the optical system starts executing its scan operation, the full-speed unit home position sensor detects the passing of the optical system; and after a predetermined time, the timing roller clutch rotates. Paper is then fed in the drum direction (the operating time of the timing roller clutch is determined separately for each paper size).
   - Paper is transported smoothly as a result of the pressure applied to the timing roller by the pressure springs located at both ends.

3. Multi-sheet bypass paper feed operation

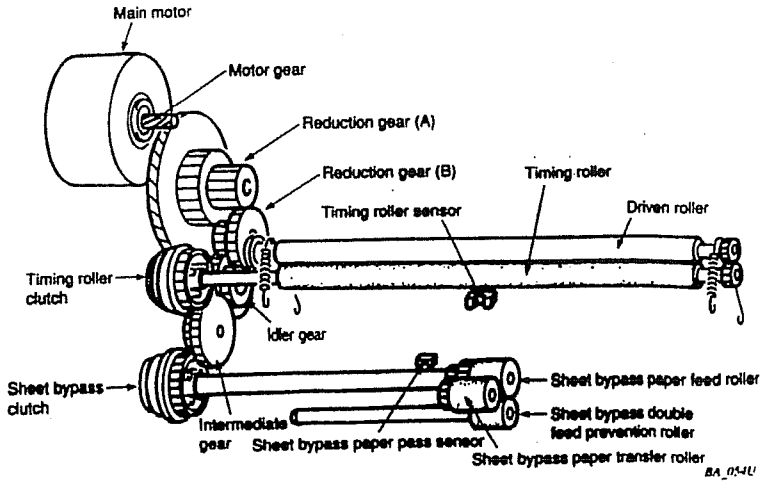


Figure 2-5-1

1) When the multi-sheet bypass is selected and the PRINT key is pressed, the main motor rotation is transmitted to timing roller clutch gear and sheet bypass clutch gear via reduction gear (B).
2) After a predetermined time, the sheet bypass clutch turns ON, the paper transfer roller is lowered to contact the paper by the torque limiter mounted on the sheet bypass paper transfer roller. At the same time, the paper stopper is released to allow paper to be fed from the bypass.

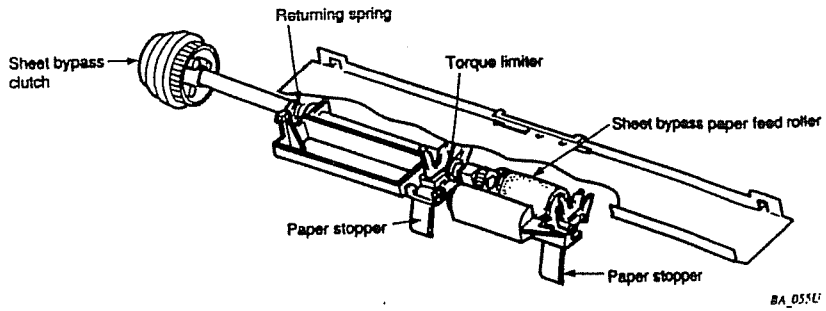


Figure 2-5-2

3) Next, the paper is fed by the paper transfer roller and the sheet bypass paper feed roller.
   Note: In the event of paper double feed, the sheet bypass double feed prevention roller starts rotating in the counter-clockwise direction to stop the lower sheet of paper from feeding. This feeding torque is determined by the torque limiter.
4) While on its way from the sheet bypass paper feed roller, the paper is detected by the sheet bypass paper pass sensor. After a predetermined time, the sheet bypass clutch turns OFF causing the sheet bypass paper feed roller and paper transfer roller to stop. At the same time, the paper transfer roller is returned to home position by returning spring
   - If the sheet bypass paper pass sensor does not detect the arrival of paper within a predetermined time, "P" (ADD PAPER) is displayed, and the copier stops.
   - If the sheet byass paper pass sensor detects the paper trail edge later, the timing roller sensor does not detect the arrival of paper within a predetermined time, PAPER JAM and WAIT are displayed, +24V is cut off, and the copier stops.

4. Paper feed unit removal

1) Removal of sheet bypass paper feed roller, sheet bypass double feed prevention roller and torque limiter
   a) Open the left cover.
   b) Curve the paper guide plate (A) and remove it.

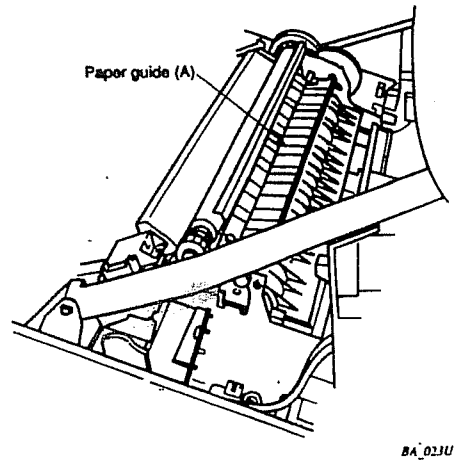


Figure 2-7-1

c) Remove the paper guide plate (B) (2 screws).

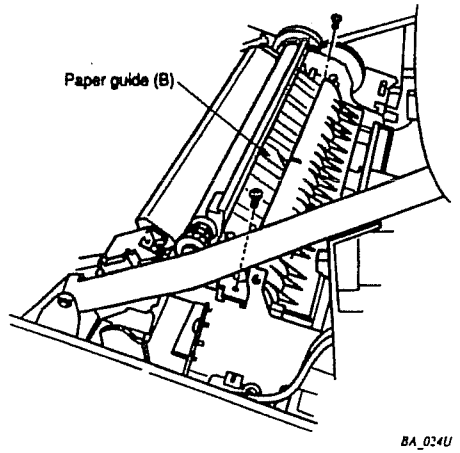


Figure 2-7-2

d) Remove the sheet bypass paper feed roller and double feed prevention roller (1 touch-ring each).
e) Remove the torque limiter from double feed prevention roller.

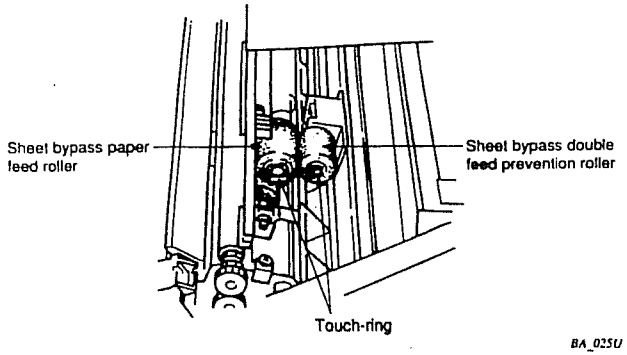


Figure 2-8-1

f) Reassemble in reverse order.
Note: One way bearing side of the sheet bypass paper feed roller goes to the rear.

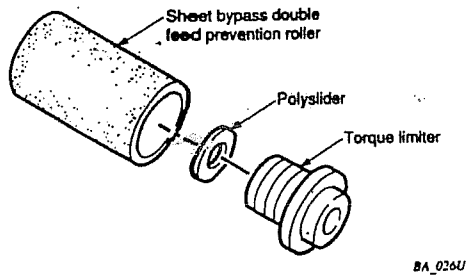


Figure 2-8-2

2) Removal of sheet bypass paper transfer roller
a) Remove the roller cover.
Note The roller cover is clipped onto the shaft as shown (X) in Figure 2-9-1. care must the taken not to bend the roller assembly when removing the roller cover.

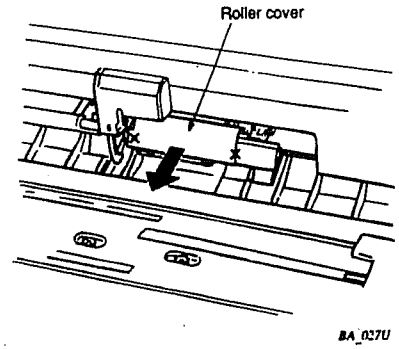


Figure 2-9-1

b) Remove the sheet bypass paper transfer roller.
c) Reassemble in the reverse order.

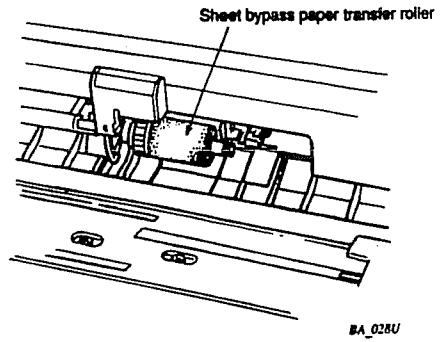


Figure 2-9-2

3) Removal of paper feed roller
   a) Open the left cover.
   b) Remove the developer unit (Refer to Developer unit removal).
   c) Lift up the paper tray and pull it out fully, raise the paper tray and pull towards you to remove it.
   d) Push the paper guide plate stoppers in the arrow direction and remove the paper guide plate.

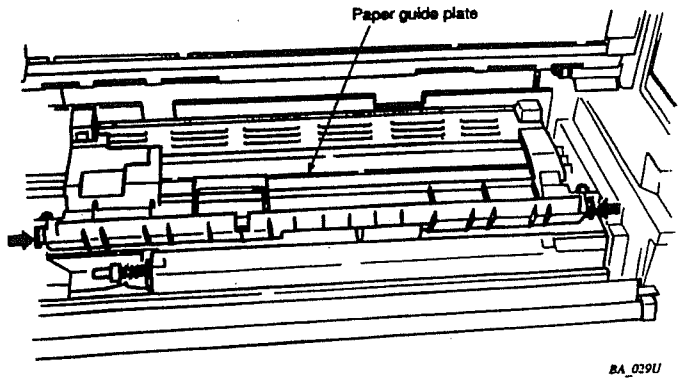


Figure 2-10-1

   e) Remove the roller stopper (1 screw).
   f) Remove the paper feed roller.
   g) Reassemble in the reserve order.
   Note: When the paper feed roller is installed, the one-way clutch on the paper feed roller is to the rear.

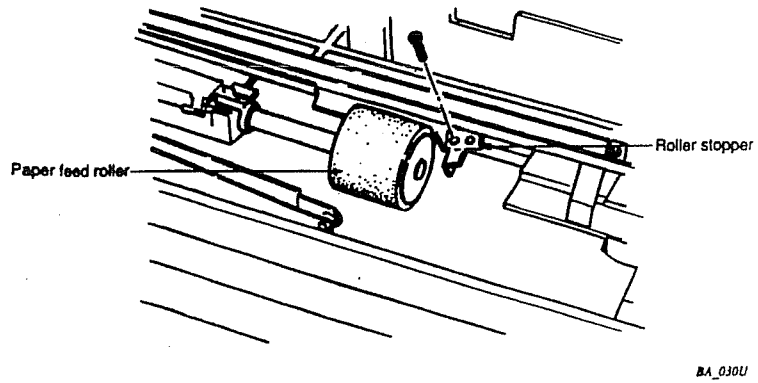


Figure 2-10-2

4) Removal of cassette double feed prevention roller
   a) Lift up the paper tray and pull it out fully, raise the paper tray and pull towards you to remove it.
   b) Remove the roller cover screws (2 screws) and push the hooks in the arrow direction then remove the roller cover..

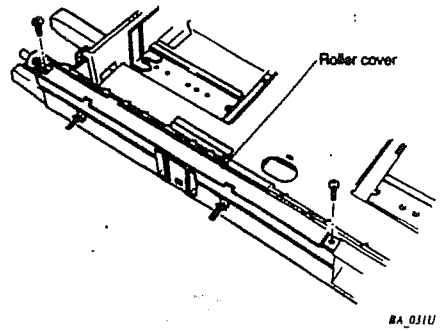


Figure 2-11-1

   c) Remove the double feed prevention roller (1 touch-ring).
   d) Remove the torque limiter from double feed prevention roller.

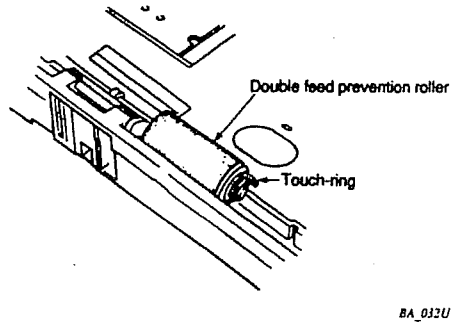


Figure 2-11-2

   e) Reassemble in the reverse order.

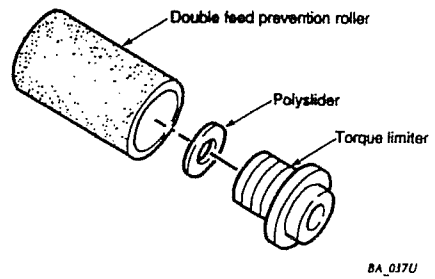


Figure 2-11-3

2.3 Developer unit

1. Developer unit operation

1) The developer (approx. 650 g) is kept inside the developer mixing section; 4% is powdered non-magnetic toner and the remainder consists of magnetic carrier particles.
2) The rotation force of the main motor is transmitted from reduction gear (A) to the developer drive gear, which rotates the magnet roller gear. The magnet roller gear, which is interlocked with the mixing gear and transport coil gear, performs the mixing operation of the developer and causes the toner and carrier particles within the developer unit to respectively assume a positive (+) and negative (-) friction charge.

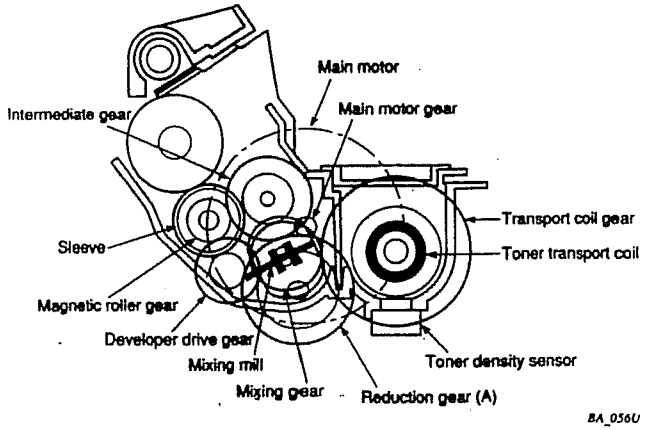
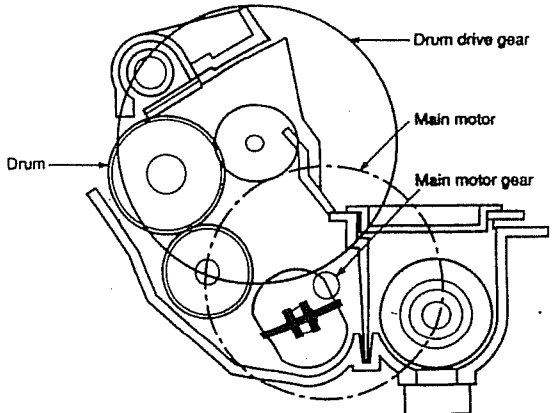


Figure 2-12-1

3) Rotation of the drum is driven by the rotation force of the main motor via drum drive gear.



4) The sleeve, which is a rotating aluminum cylinder, rotates counterclockwise at 211.6 rpm. The magnet inside the sleeve causes the mixed developer to adhere to the sleeve's outer surface where it forms a magnetic brush. The sleeve moves in the counterclockwise direction. A doctor blade, mounted 0.65 mm from the sleeve, determines the height of the magnetic brush as the developer passes through the gap.
5) The drum on which the electrostatic latent image has been formed (negative charge pattern) is rotating in the clockwise direction, and contacts the magnetic brush of the sleeve.
The gap between the drum and sleeve is 0.85 mm.
The sleeve assumes the opposite polarity (positive), so the toner adheres to the electrostatic latent image. Meanwhile, a bias voltage of – 250VDC is being applied to the sleeve in order to regulate the amount of toner adhering control to the drum as well as the dispersal of toner.
The 0.85 mm gap between the drum and sleeve is regulated by a spacer ring with a diameter that is 1.70 mm larger than the sleeve diameter and contacts the edges of the drum.

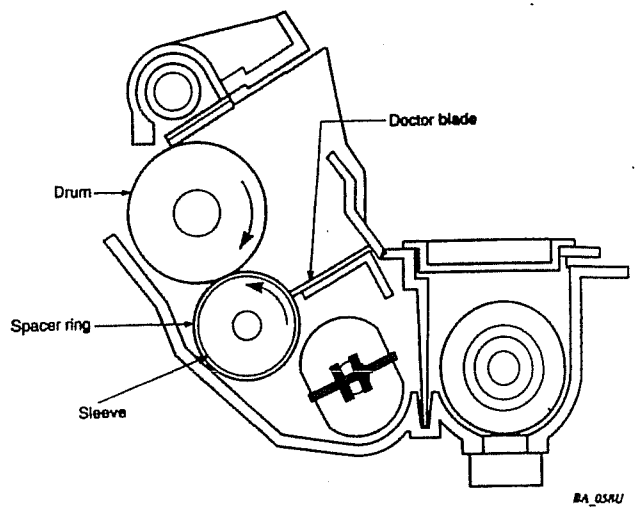


Figure 2-13-1

2. Toner density/level control

1) The toner density sensor mounted in the developer mixing section controls the toner density. The toner density sensor uses a inductance type sensor. When it detects the toner amount in the developer mixing section as being below the required level, a fixed amount of toner is supplied to the developer mixing section.
2) The developer is a mixture of a magnetic carrier and non magnetic toner. If the toner amount in the developer mixing section is above the required amount, the percentage of magnetic carrier is less, and the magnetic resistance decreases. Inversely, if the toner amount in the developer mixing section is below the predetermined amount, the percentage of magnetic carrier is greater, and the magnetic resistance increases. The toner supply is regulated by the detection of the changes in magnetic resistance.

   Note: When using magnetic materials, the magnetic resistance decreases as the cross-sectional area increases, or as the magnetic path shortens. The inductance type sensor has the same core as drive coil L1, detection coil L3, and standard coil L2. Therefore, when L1 is driven by a high frequency, the output voltages of L2 and L3 at the standard toner density level become equal. This allows detection coil L3's output to change, to correspond with the changes in toner density

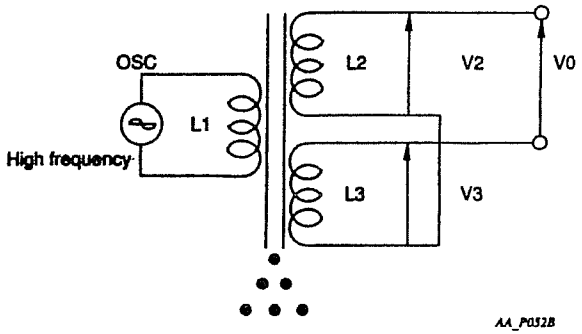


Figure 2-14-1

3) When the toner is consumed and the toner density decreases, the sensor output (VO) increases. When the sensor output exceeds the standard voltage (Vs), the toner supply/shutter motor rotates the toner bottle to supply toner to the developer mixing section.
   This maintains a uniform toner density.
4) Toner level indication is carried out with the toner density sensor detecting changes in toner density when the toner is supplied to the developer mixing section.When this density change is greater than the standard level, the presence of toner is determined. If it is less that the standard, the absence of toner is detected and the ADD TONER indicator lights.

3. Drum cleaning operation

1) After developing and transfer are completed, some toner is left on the drum surface. This remaining toner is scraped off by a cleaning blade. The cleaning blade remains in constant contact with the drum surface at a fixed pressure (due to the elasticity of the cleaning blade) and functions to clean the drum surface.
2) The remaining toner scraped off by the cleaning blade is fed into the cleaning frame and carried to the front of the developer unit by the rotation of the toner transport spiral, then stored in the waste toner bottle for disposal.

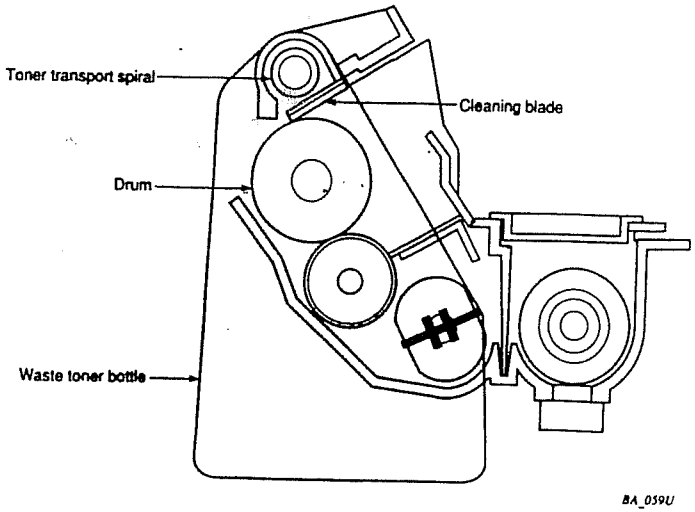


Figure 2-15-1

4. **Developer unit removal**
   1) Replacement of drum, cleaning blade and developer
      Caution: • After the developer is replaced, the automatic gain adjustment for the Toner Density Sensor (F8-09) (Refer to 5. Developer unit adjustment on page 2-20) and the Exposure Standard adjustment (F6-11) must be performed (Refer to 7. Optical unit adjustment on page 2-40).
      • After drum is replaced, the Exposure Standard adjustment (F6-11) must be performed (Refer to 7. Optical unit adjustment on page 2-40).
      a) Open the toner hopper cover.
      b) Open the left cover.
      c) Remove the waste toner bottle.
      d) Disconnect the developer unit connector.
      e) Remove the developer unit (2 screws).
      Caution: • When handling the developer unit (removing/installing), pay close attention to the "CAUTUION" label on the drum protection cover.

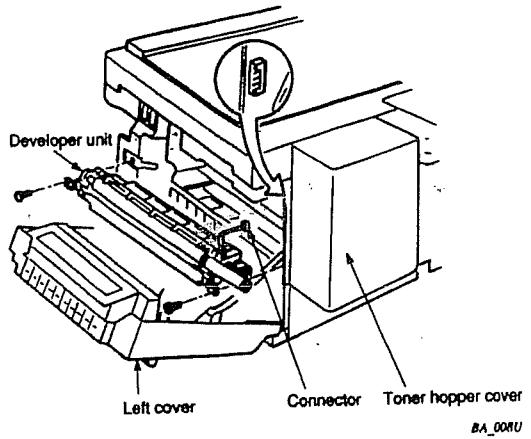


Figure 2-16-1

f) Remove the drum stoppers (front/rear) (2 screws each).
g) Remove the drum section (2 screws)

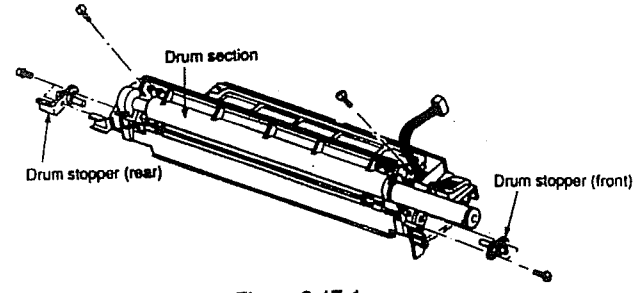


Figure 2-17-1

h) Remove the drum.
   Note: The drum should always be handled with care, whenever a drum is installed or removed in a drum section.
   Do not: • Touch the drum or mar the drum surface.
   • Expose the drum to steam, saliva, or any other liquid.
   • Expose the drum to high heat conditions
   • Expose to direct sunlight. Always cover the drum when removed from the copier with a clean sheet of paper.
   • Expose to areas with high chemical fume concentration.
i) Remove the drum cleaning blade (2 screws).

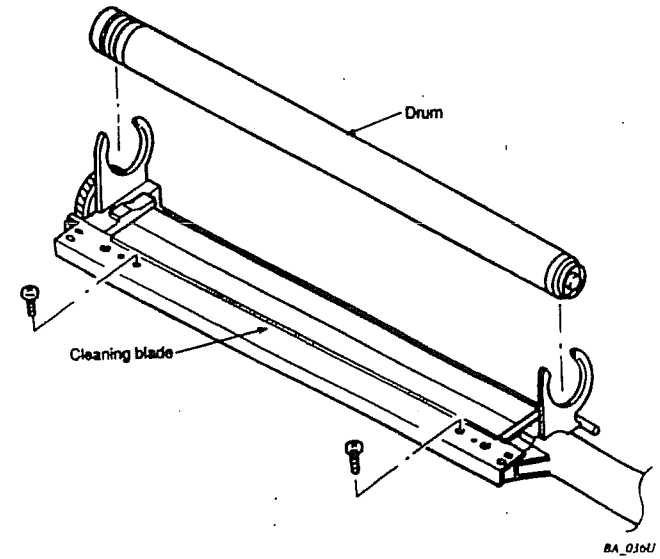


Figure 2-17-2

j) Remove the developer unit lid.

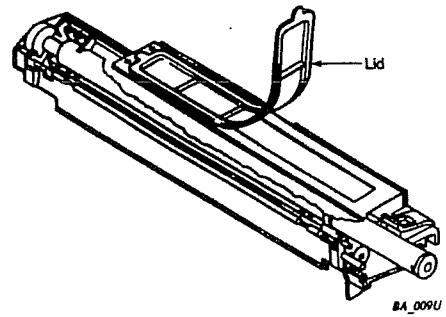


Figure 2-18-1

k) Tilt the developer unit over a newspaper or a suitable container. The majority of the developer should fall out. Some developer will remain on and under the magnetic roller.
l) Take a new bottle of developer and shake it approximately 10 to 15 times.
m) Pour the entire bottle of developer into the unit evenly.
n) Reassemble in the reverse order.

2) Removal of charge corona
   a) Remove the developer unit (Refer to Developer unit removal on page 2-16).
   b) Remove the charge corona cover (1 screw) and remove the charge corona.

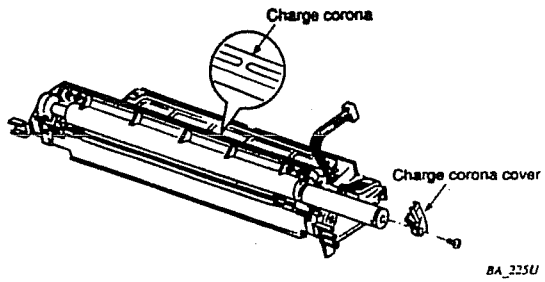


Figure 2-18-2

3) Drum cleaning
   Drum cleaning should be done only when absolutely necessary. Do not use alcohol and organic matter
   Note:
   - Partial cleaning of the drum should be avoided.
   - Even if the blot on the drum surface is partial, the whole surface must be cleaned.
   - Cleaning the drum could reduce the normal life of the drum. Only clean when absolutely necessary.

   a) Remove the drum as described in step 1, a to h.
   b) With a soft pad wipe off lightly any foreign substance on the drum surface such as toner and dust.
   c) Clean the drum flanges with a soft pad.
   d) Reassemble in the reverse order.

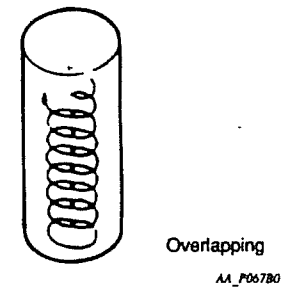


Figure 2-19-1

5. **Developer unit adjustment**
   1) Automatic gain adjustment of toner density sensor
      - After the developer and toner density sensor is replaced, this adjustment must be performed.
      - When the power switch turns ON and the ADD TONER indicator flashes, toner is supplied automatically during initialization operation, then toner density change is greater than the standard level.

      a) Remove the developer unit.
      b) Press the PAPER TRAY, ZOOM DOWN and 1 DIGIT keys to enter the F mode.
      c) Re-install the developer unit.
      d) Set the F8-09.
      e) Press PRINT key for automatic TDC sensor gain adjustment. (Wait approximately 2 minutes until the adjustment cycle stops.)
      f) Write the contents of F6-21 and 26 to the memory sheet.
      g) Press the PAPER TRAY, ZOOM DOWN and CLEAR/STOP keys to escape from the F mode.

2.4 Hopper unit

1. **Toner supply operation**
   The hopper unit stores the toner that is supplied to the developer mixing section. A microprocessor controls the amount of toner that the hopper releases into the mixing section.
   1) When the toner density sensor detects that the toner level is too low, the microprocessor outputs a signal to rotate the toner supply/blacking prevention film motor, causing the motor to rotate.
   2) The rotational force of the toner supply/shutter motor is transmitted via drive gears to rotate the toner transport spiral, so toner can be supplied to the developer mixing section. The agitation and mixing shaft rotates together with the toner transport spiral and supplies toner to the toner transport spiral.

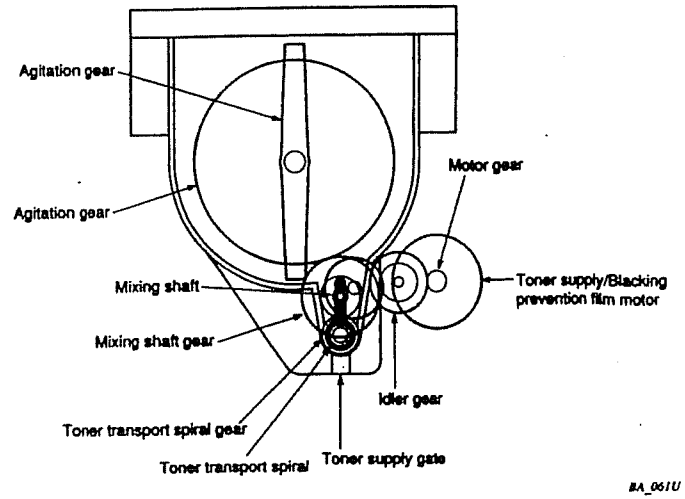


Figure 2-21-1

2. Toner transport pipe shutter operation

This mechanism functions to close and open the opening in the toner transport pipe of toner hopper unit as the developer unit is removed from, and installed into, the copier.

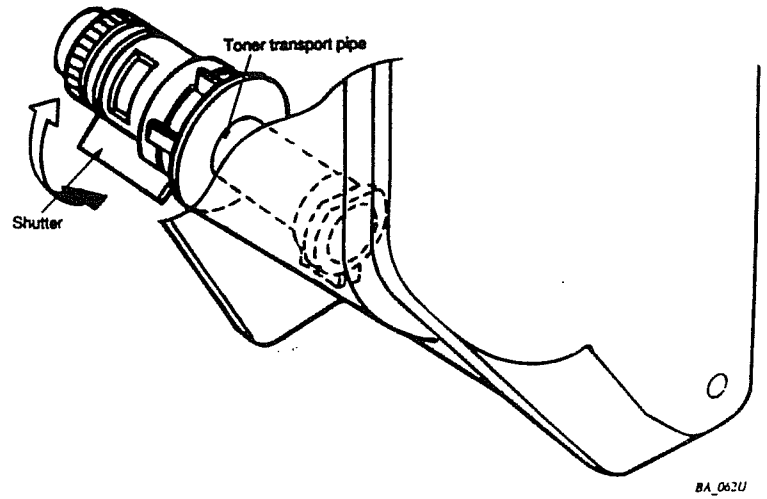


Figure 2-22-1

2.5 Fuser unit

1. Fuser operation

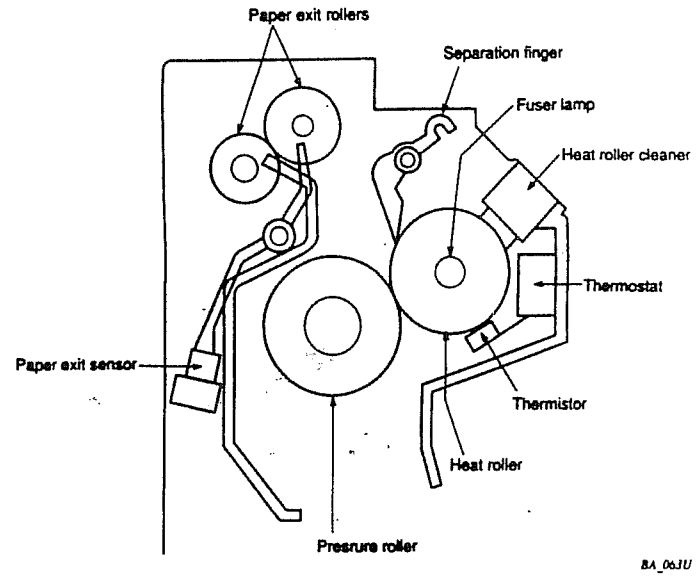


Figure 2-23-1

1) When the power switch is turned ON, the fuser lamp lights and the heat roller starts to warm up.
2) In the center of the teflon coated heat roller is a fuser lamp (halogen lamp) that serves as the heat source. The surface temperature of the heat roller is held at approximately 180°C. The temperature is monitored by a thermistor that contacts the heat roller surface. The CPU control circuit switches the fuser lamp ON/OFF in order to maintain a constant temperature for the heat roller.
3) A thermostat is mounted next to the heat roller as a safety precaution against abnormal temperature increases of the heat roller. The thermostat turns off the fuser lamp if the heat roller temperature reaches an abnormal temperature.
4) The pressure roller is silicon rubber and applies a uniform pressure of approximately 0.5 kg/cm against the heat roller. This pressure can be adjusted by the pressure spring.
5) When the temperature in the heat roller reaches approximately 160°C, the main motor turns ON and rotates the heat roller, pressure roller and the paper exit rollers. At this time, developer unit initialization starts.
6) Separation fingers are pressed against the heat roller to prevent the copy paper from sticking to the roller.

7) To prevent the heat roller from becoming dirty during copy operations, it is constantly cleaned by a heat roller cleaner.
8) During the final copy operation, the paper exit sensor is turned ON when detecting the paper exiting, and within a predetermined time, the main motor turns OFF. The heat roller, pressure roller and paper exit rollers stop.

Note:
- If the heat roller does not reach the proper operating temperature within a predetermined time after the fuser lamp is lit, "E4" and "01" will appear in the display.
- During the copy operation, the fuser lamp is turned ON. If the heat roller temperature is approximately 150°C or less, WAIT is displayed on the control panel and the copy operation will stop after ejecting the paper. (Copy operation is available by pressing the PRINT key again after the WAIT indication goes off.)
- When "E4" and "01" are displayed, "E4" and "01" can be cleared by opening/closing the left cover switch OFF/ON after the repair is completed.
- When the thermistor is short-circuited or open, "E4" and "01" are displayed.

2. Fuser unit removal

1) Removal of pressure roller, fuser lamp and heat roller
   a) Open the left cover.
   b) Remove the heat roller cleaner.
   c) Remove the fuser cover (2 screws).

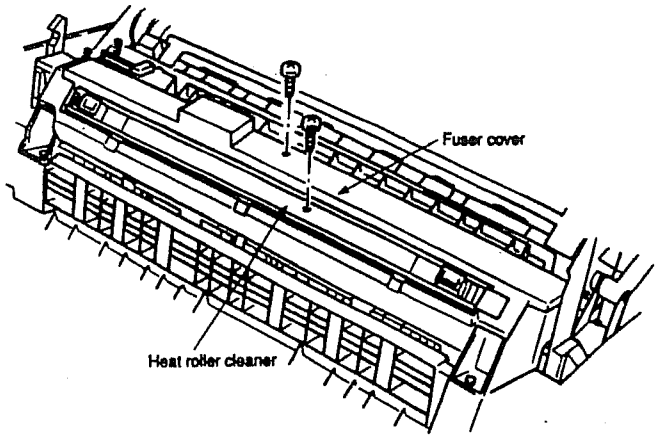


Figure 2-25-1

   d) Remove the fuser lead wire (2 screws).
   e) Disconnect the thermistor connector.
   f) Remove the heat roller section (6 screws).

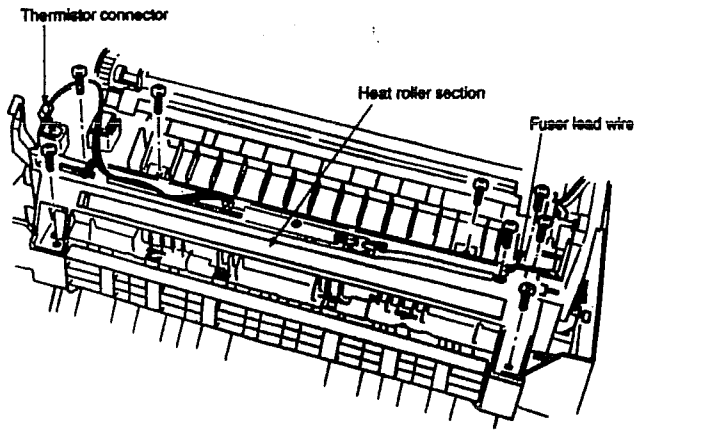


Figure 2-25-2

g) Remove the pressure roller.

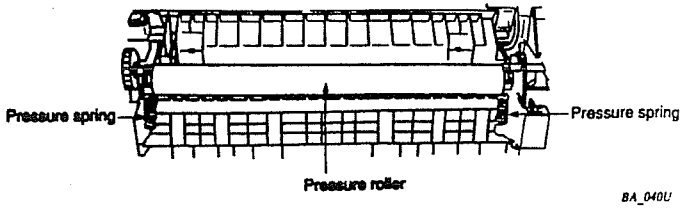


Figure 2-26-1

h) Remove the bearings from pressure roller.

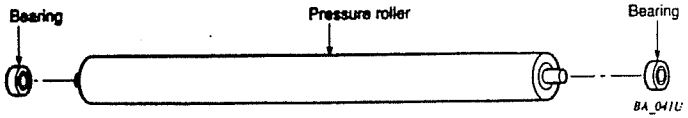


Figure 2-26-2

i) Remove the lamp holder (rear) (1 screw).
j) Remove the fuser lamp.

Note
- Do not touch the glass portion of the lamp.
- When the lamp is installed, the rated voltage mark must be towards the rear.
- When installing the lamp, make sure it contacts the rear fuser lamp terminal.

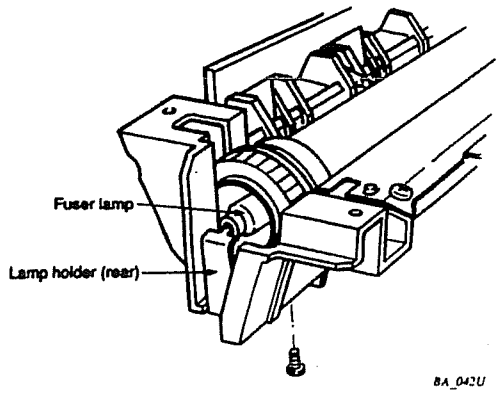


Figure 2-26-3

k) Remove the separation fingers (4 pieces).

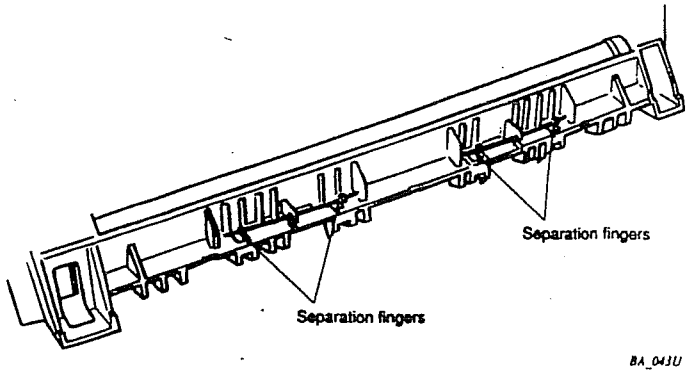


Figure 2-27-1

l) Remove the heat roller section mounting bracket with ground plate. (2 screws).
m) Remove the heat roller assembly.

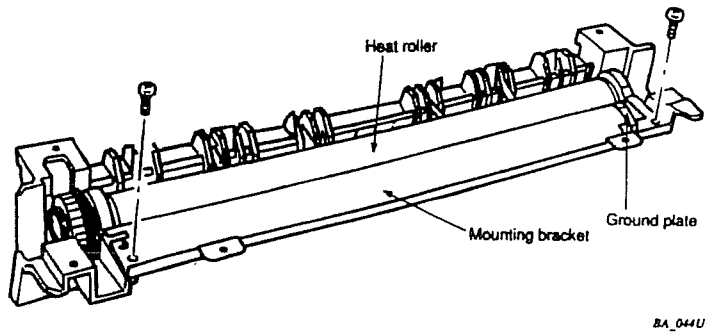


Figure 2-27-2

n) Remove the fuser drive gear and bushings.
o) Reassemble in the reverse order.

Note: When installing the pressure roller, make sure pressure roller spring is installed to the roller mounting bracket.

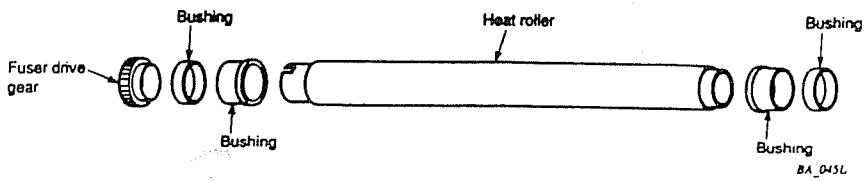


Figure 2-27-3

2.6 Optical unit

1. Optical system operation

As Figure 2-28-1 shows, there is a full-speed unit home position sensor on the left side of the copier. The sensor plate on the full-speed unit controls the optical system by switching the full-speed unit home position sensor ON/OFF.

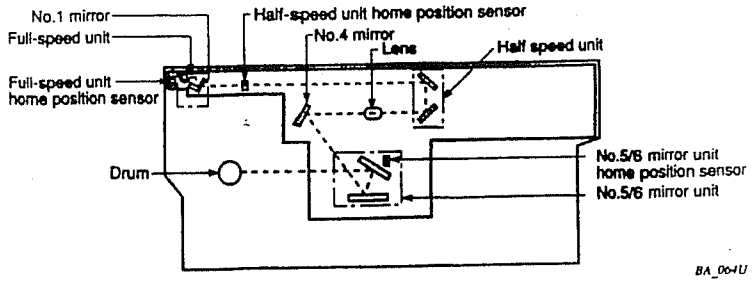


Figure 2-28-1

When the power is turned ON, the lamp unit scanner motor starts to turn and move the full-speed unit, half-speed unit and No.5/6 mirror, whether or not the full-speed unit home position sensor detects the sensor plate.

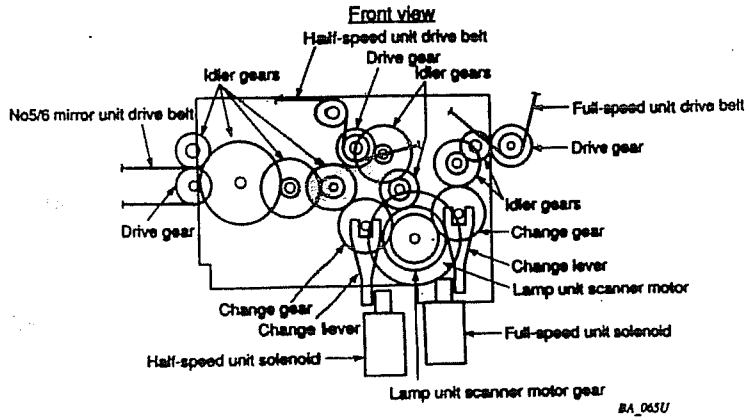


Figure 2-28-2

Unit operation (Solenoid Signal)

	Scan	Half-speed unit copy ratio	No.5/6 mirror unit copy ratio
Half-speed unit solenoid	OFF	ON	ON
Full-speed unit	OFF	OFF	ON

2. Auto original density control operation (Pre-scan)

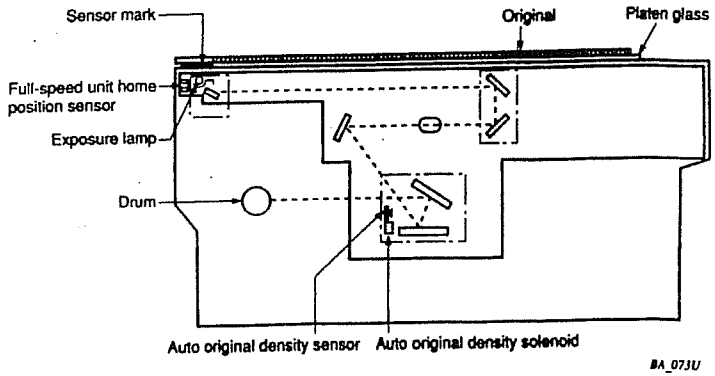


Figure 2-29-1

1) When the PRINT key is pressed, the fuser cooling fan turns at full speed, the main motor turns.
2) After a predetermined time, the exposure lamp lights, and the auto original density solenoid comes on to move the auto original density sensor to the center of the optical axis. At the same time,the lamp unit scanner motor turns forward and the full-speed unit and half-speed unit start. They move approximately 5.9" (15cm) in the direction of the end position, then return.
3) During this return, the original density value read in the auto original density sensor is output to the CPU PCB. The CPU calculates the difference between this density and the density of the standard density mark and sets the exposure lamp voltage to match the density of the original.
4) When the optics home position sensor detects the full-speed unit, the lamp unit scanner motor stops, the auto original density sensor also moves to its home position, and the copy operation starts with the density level determined by the auto original density sensor operation.
5) When the full-speed unit movement turns off the optics home position sensor, the registration timing starts. When the predetermined time has passed, the timing roller clutch comes on to feed the copy paper.
6) After the operating time specified for the size of paper being used lapses, the lamp unit scanner motor rotates in reverse, the exposure lamp goes off, and the full-speed unit moves in the direction of the optics home position sensor.
7) The lamp unit scanner motor is a stepping motor. It is controlled by the pulses output from the CPU PCB.

3. **Constant light volume measurement operation**
   1) When the fuser lamp is on more than 20 seconds, the exposure lamp lights the standard density mark and at the same time the auto original density solenoid turns on to move the auto original density sensor to the center of the optical axis. This operation raises the exposure lamp voltage until the auto density sensor output reaches the level set when the constant light volume was adjusted.
   2) When the auto original density sensor output reaches this level, the exposure lamp goes out. The auto original density sensor output just before the lamp goes out is stored into the non-volatile memory, and the exposure lamp voltage becomes the standard for copying. (F6-15 and F6-16)
   3) The constant light volume measurement operation can be turned off using F5-24.

4. **Reduction and Enlargement mechanism**

The optical unit is composed of a through-lens, mirrors and exposure lamp. It uses a mirror movement system and a slit-exposure system. Reduction and enlargement are performed by the following four methods:

1) Magnification change ratio (Half-speed unit and No.5/6 mirror unit movement system)
2) Variation of optical system scan speed.
3) Exposure lamp voltage change.
4) Blacking prevention film change

1) **Magnification change ratio (Half-speed unit and No.5/6 mirror unit movement system)**

When in the Reduction/Enlargement mode, with the 1:1 position as a standard, the distance from the original to the lens is changed by moving the half-speed unit. The distance from the lens to the drum is also changed by moving the No.5/6 mirror.

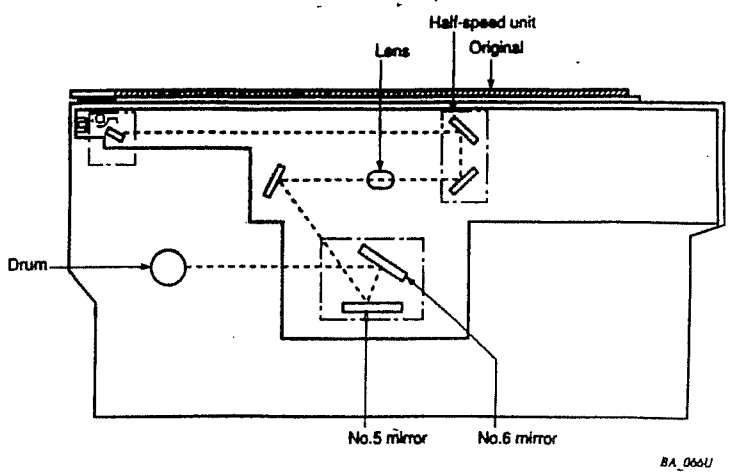


Figure 2-31-1

(Half-speed unit movement operation)

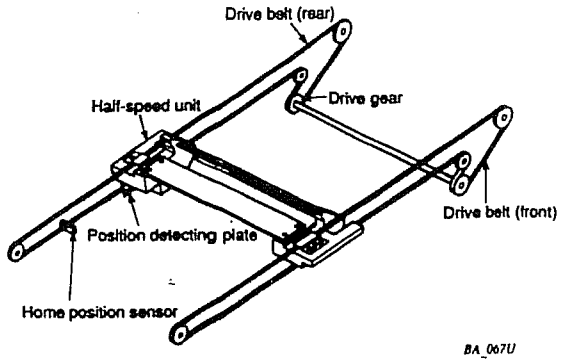


Figure 2-32-1

1) When the microprocessor outputs a rotation pulse that conforms to the copy ratio (0.2 mm of movement per pulse), the lamp unit scanner motor begins rotating. This rotation force is transmitted to the idler gear and half-speed unit drive gear to move the half-speed unit to the desired position by the half-speed unit drive belt.
2) The stopping position of the half-speed unit that conforms to the copy ratio is detected by the half-speed unit position detecting plate and half-speed unit home position sensor, which are mounted on the half-speed unit.

(No.5/6 mirror unit movement operation)

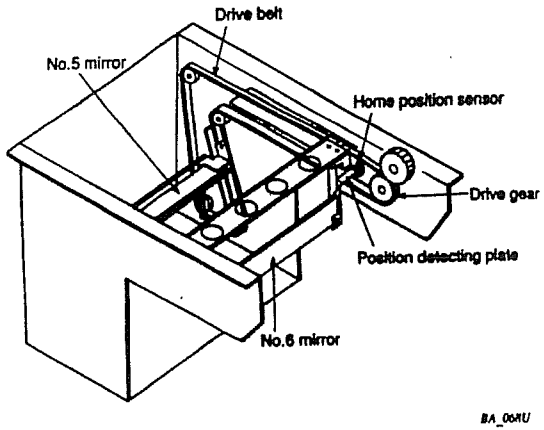


Figure 2-33-1

1) When the microprocessor outputs a rotation pulse that conforms to the copy ratio (0.13 mm of movement per pulse), the lamp unit scanner motor begins rotating. This rotation force is transmitted to the idler gear and mirror drive gear to move the No.5/6 mirror to the desired position by the No.5/6 mirror unit drive belt.
2) The stopping position of the No.5/6 mirror that conforms to the copy ratio is detected by the No.5/6 mirror position detecting plate and No.5/6 mirror unit home position sensor, which are mounted on the No.6 mirror holder (rear).

2) **Variation of optical system scan speed**

The optical system scan speed is changed (between full-speed unit and half-speed unit) according to the copy ratio. This speed change is performed by dividing the frequency of the crystal oscillator on the CPU PCB.

a) The width direction of the original image that is sent by the mirror and lens is irradiated on drum surface without relationship to the slit as in the figure.

b) When making a reduction, the drum image a+b+c is the irradiated figure of the reduced original image A+B+C. While the drum image distance is being changed, the speed is increased so that the original image A+B+C exposure can be sent.

c) The scan speed will only alter the size of the image from lead to trail edge. The scan speed is increased for reduction and decreased for enlargement.

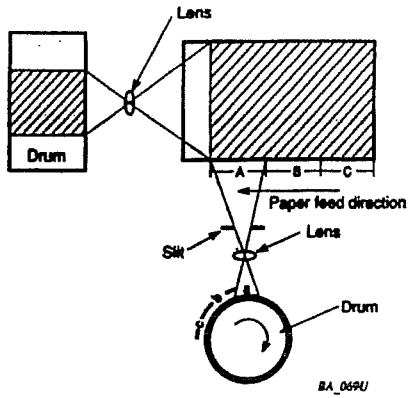


Figure 2-34-1

3) **Exposure lamp voltage change**

- The amount of light on the drum decreases for enlargement copying, so the exposure is increased to compensate.
- The amount of light on the drum increases for reduction copying, so the exposure is decreased to compensate.

4) **Blacking prevention film change**

- In reduction, the sections of the drum, not exposed by the lamp retain a charge, forming toner build up on both edges of the drum. The result is wasted toner and dirty copies.
- The charge left on the drum after transfer is removed by fully exposing the drum surface to the discharge lamp and blacking prevention film, which is also used for reduction blacking prevention.
- The blacking prevention film position changes according to the reduction ratio selected.
- The blacking prevention film movement operation is accomplished by the of toner supply/blacking prevention film motor.

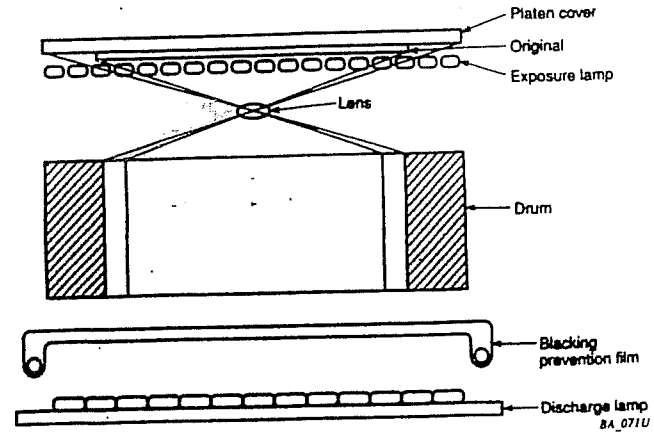


Figure 2-35-1

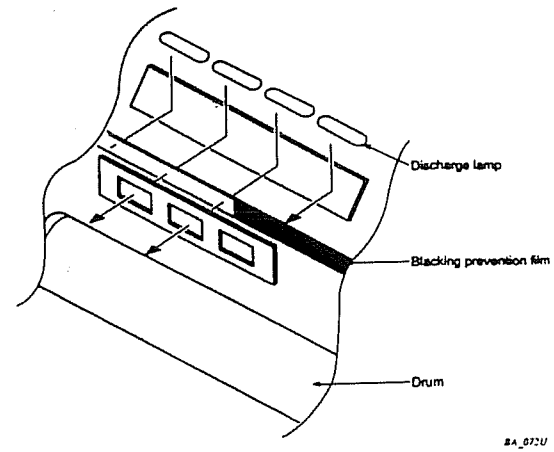


Figure 2-35-2

5. **Other operations**
   - A thermostat is incorporated in the optical system to prevent over temperature caused by the exposure lamp.
   - In PHOTO Mode, the amount of exposure is automatically decreased. In PHOTO Mode and DOCUMENT Mode the amount of exposure can be changed with the copy density select keys.

6. **Optical unit removal**
   1) Removal of exposure lamp
      Caution: After the exposure lamp is replaced, the Exposure Standard adjustment must be performed. (Refer to 7. Optical unit adjustment on page 2-40).
      a) Turn the power off and unplug the copier
      b) Remove the glass holder (left) (3 screws) and remove the platen glass.
      c) Align the full-speed unit with the opening in upper frame for easy access to the exposure lamp terminal screw.
         Note: Full-speed unit can only be moved by rotating drive shaft (located on right side). A glip is provided on the shaft.
      d) Remove the reflector plate (upper) (2 screws).
      e) Remove front exposure lamp terminal (front) (1 screw).
      f) Remove the exposure lamp.
      g) Reassemble in the reverse order.

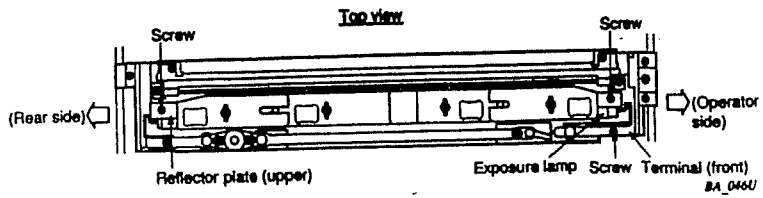


Figure 2-37-1

7. Optical unit adjustment

1) Copy density difference adjustmentThis adjustment should only be performed when absolutely necessary. Perform this adjustment when there is a copy density difference. Before adjustment, confirm that there is no dirt or condensation on the lens or mirrors.
   a) Select the F8-C00 mode.
   b) Press the PRINT key, the full-speed unit will move to the right.
   c) Turn the power off and unplug the copier.
   d) Remove the glass holder (left) (3 screws) and remove the platen glass.
   e) Loosen the aperture plate mounting screws (4 screws).
   f) Adjust the aperture plate.
      Note: If the copy density is light, make the aperture opening narrower. If the copy density is dark, widen the aperture.

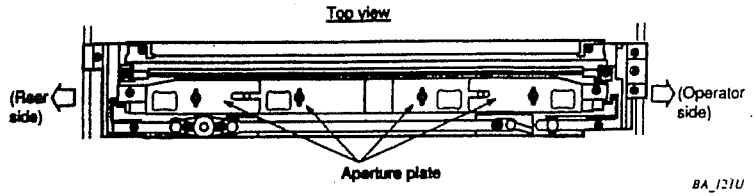


Figure 2-38-1

2) Optical skew adjustment
This adjustment should only be peformed when absolutely necessary. Perform this adjustment when there is copy skew. This adjustment should be previously checked at installation.
   a) Remove the platen glass.
   b) Loosen the belt clamp (front) mounting screws (2 screws).
   c) Turn adjustment screw as shown in figure below.
      Note If it is required to adjust the skew again, move the belt clamp (front) in small movements very carefully and check for skew.

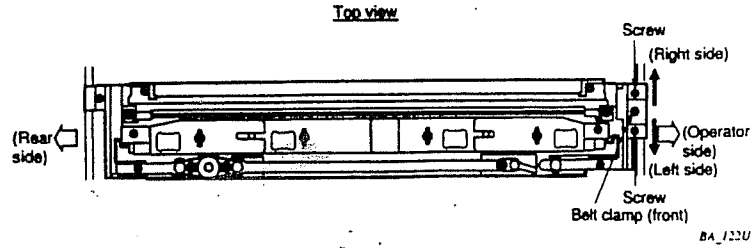


Figure 2-39-1

- From the operator side of copier, move the belt clamp (front) to the right side.

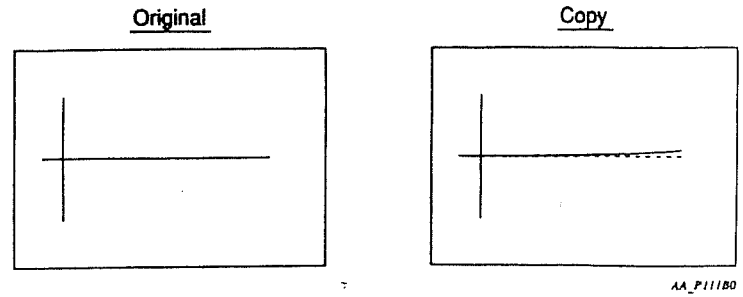


Figure 2-39-2

- From the operator side of copier, move the belt clamp (front) to the left side.

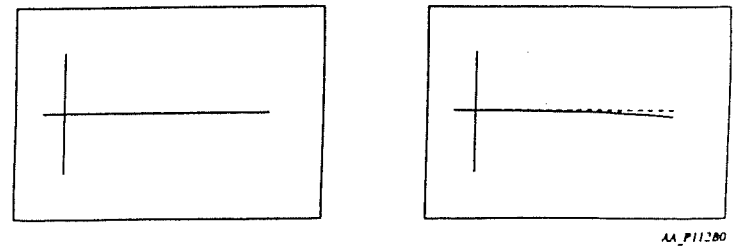


Figure 2-39-3

3) Exposure standard adjustment
- After the durm, exposure lamp and auto original density sensor is replaced, this adjustment must be performed.

a) Enter the F6 mode.
b) Comfirm F6-C61 is 0, and change if necessary. (If drum is replaced)
c) Enter the F2 mode and set the exposure to the center position in the DOCUMENT mode.
d) Make a copy of Test Chart #53 (Ledger size) or #54 (A3 size) with Gray Scale (P/N: FQ-SJ101).
- Gray Scale 1 should not be visible.
- Gray Scale 2 should be clearly visible.

e) F6-11 adjustment.
Note: If the density light, (-) direction = density darker.
If the density dark, (+) direction = density lighter.

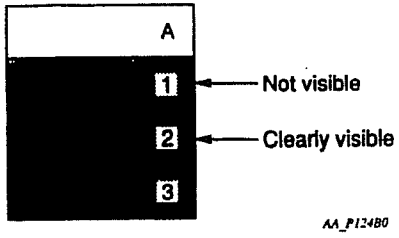


Figure 2-40-1

f) Repeat steps c to e until the proper density is attained.

4) Full-speed unit and half-speed unit position adjustment
When the full-speed unit and half-speed unit are moved by hand, position slippage may occur, then this adjustment must be performed.

(Full-speed unit)
a) Release the full-speed unit shaft stoppers (front/rear), then lift up the shaft.
b) Manually move the full-speed unit to the paper exit side fully.
c) Lock the full-speed unit shaft stoppers while firmly holding the full-speed unit against the exit side frame.

(Half-speed unit)
a) Loosen the belt clamps (front/rear) mounting screws (1 screw each).
b) Manually move the half-speed unit so that the half-speed unit contacts the rail stoppers (front/rear).
c) Tighten the belt clamp (front/rear) mounting screws.

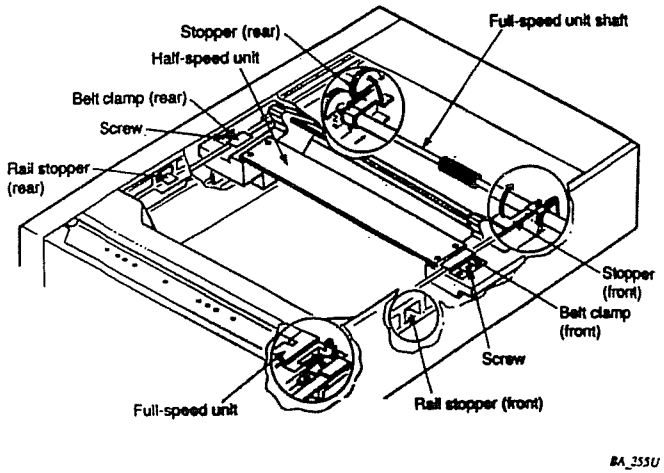


Figure 2-41-1

2.7 Miscellaneous removal

1) Removal of ozone filter
   a) Open the left cover.
   b) Push the hook in the arrow direction and remove the ozone filter assembly.

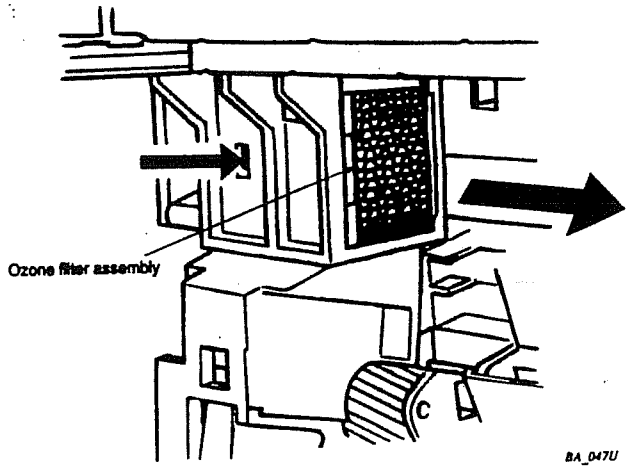


Figure 2-42-1

   c) Remove the ozone filter.
   d) Reassemble in the reverse order.

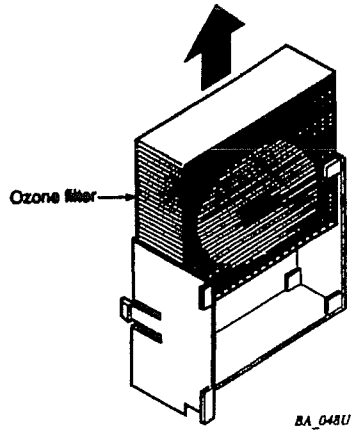


Figure 2-42-2

2) Replacement of corona wire
   When the corona wire is external dirty, loose, damaged, or broken, replacement is necessary.
   (Charge corona)
   a) Remove the grid plate.
   b) Remove the rear cover.
   c) Remove the old wire.
   d) Hook the wire ring to the rear hook spring plate.
   e) Hook the wire ring to the front hook pin.
   f) Reaasemble in the reverse order.
   (Transfer corona)

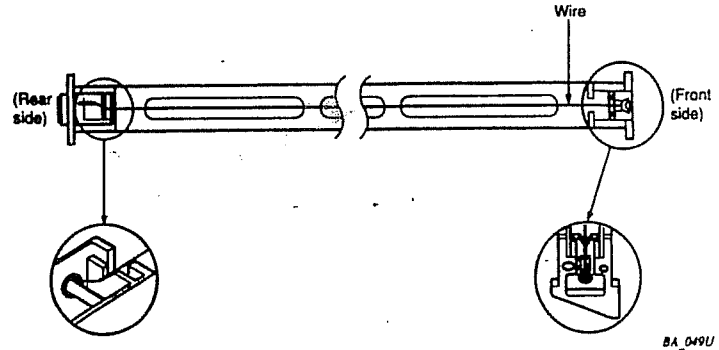


Figure 2-43-1

   a) Remove the ground plate, paper separation guide and pre-transfer roller assembly (2 screws).
   b) Remove the old wire.
   c) Hook the wire ring to the front hook pin.
   d) Hook the end of the wire ring to the tension spring.
   e) Reassemble in reverse order.

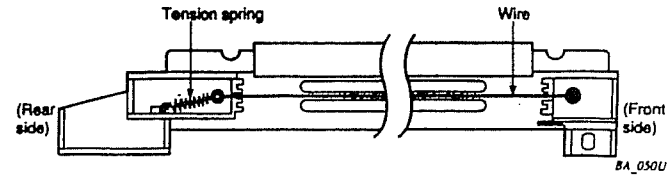


Figure 2-43-2

3) Removal of low voltage power supply PCB
When the low voltage power supply PCB is installed, the power cord connectors are to be inserted as shown in Figure 2-44-1.
a) Remove the right cover (2 screws).
b) Remove the ground plate (3 screws).
c) Disconnect all connectors.
d) Remove the low voltage power supply PCB assembly (3 screws).

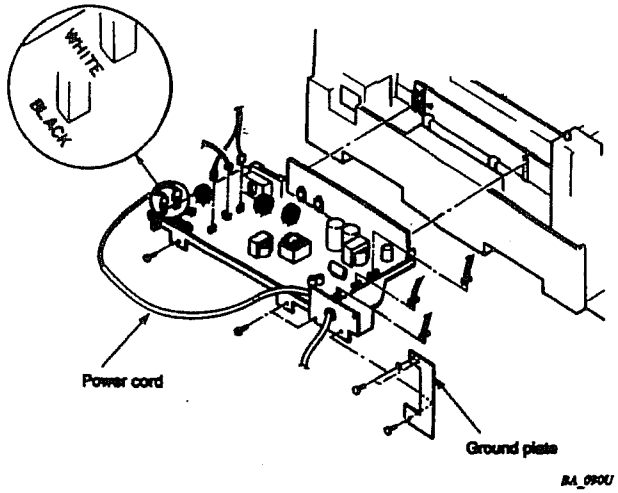
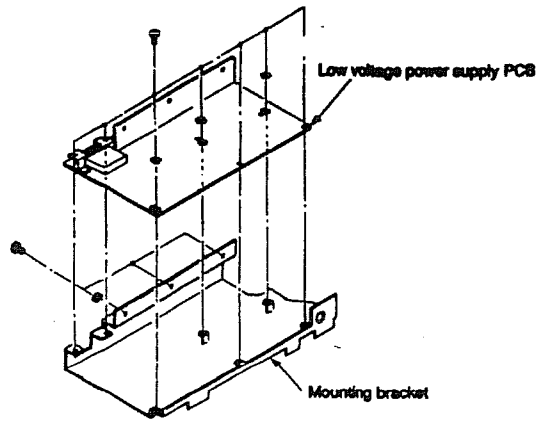


Figure 2-44-1

e) Remove the low voltage power supply PCB from mounting bracket (10 screws).
f) Reassemble in the reverse order.



Section III
Preventive Maintenance

3.1 General

1. A preventive maintenance inspection of the copier should be performed every 30,000 copies. If the preventive maintenance inspection is correctly performed, high quality copies can be maintained for a long period of time, machine down time can be reduced, and the number of service calls minimized.
2. Refer to the attached chart for the schedule of replacements at 30,000 copy PM.
3. A high voltage hazard remains even when the machine is not operating. Always disconnect the machine from its power source (wall outlet) before servicing or disassembly.

3.2 Recommended tools

1. The following items are necessary to perform an effective, time efficient PM.
   a) Vacuum cleaner
   b) Blower brush
   c) Isopropyl alcohol
   d) Cleaning cotton
   e) Lint free wiper (Kim wipes)
   f) Cotton swabs
   g) Glass cleaner

3.3 Cleaning recommendations

1. It is generally recommended that during the course of each PM (or each visited time), the developer unit be removed for easy access to the general interior of the copier. Vacuuming of the copier is the first step.
2. Refer to the appropriate PM cycle on the maintenance chart (page 4-2), where the replacement and cleaning cycles are broken down by sub-assembly.
   Note: Use of IPA is strongly suggested, but it is only to be used when dry cleaning is ineffective. Excessive use of IPA can decrease the operating life of rubber components.
3. IPA should be used to clean the feed roller, timing roller, thermistor, corona, transport roller, and fuser pressure roller (only when required).
4. Cleaning with a blower brush is recommended for the corona units, optics, and general purpose.
5. Before servicing the developer unit, it is advisable to remove the drum and place in a dark safe place, away from typical drum hazards (Ex. Physical damage, direct intense light, chemical vapors, etc.).
6. Exercise caution in handling and cleaning the drum cleaning blade. Physical damage and finger marks will affect copy quality.

7. For individual removals, replacement, and adjustments refer to respective sub-assemblies information in section III.
   Caution: It is recommended that after using any cleaning agents and/or a drum refresher pad that the service technician place those items in a sealable plastic bag and discard them. It is also recommended that the service technician wash his hands after handling such items.

3.4 Maintenance chart

Item		Service / Part number	Q'ty per unit	(× 1000) 30	60	90	120
Sheet bypass	Sheet bypass paper feed roller	FFPMA0518	1	○	×	○	× (×)
	Sheet bypass double feed prevention roller	FFPMA0520	1	×	× (×)	×	× (×)
	Sheet bypass paper transfer roller	FFPMA0521	1	×	× (×)	×	× (×)
	Torque limiter	FFPXF21D80	1	×	× (×)	×	× (×)
Paper feed unit	Paper feed roller	FFPMA0516	1	○	×	○	× (×)
	Cassette double feed prevention roller	FFPMA0517	1	×	× (×)	×	× (×)
	Timing roller	FFPMA05132	1	○	○	○	○
	Driven roller	FFPMA05222	1	○	○	○	○
	Paper cleaning sheet	FFPKP00731	1	○	○	○	○
	Torque limiter	FFPXC07D80	1	×	× (×)	×	× (×)
Developer unit	Charge corona wire	FFPEY0064	1		×		×
	Charge corona	FFPXG07D80	1	○	○	○	○
	Developer	FQ-ZF13	1	×	×	×	×
	Drum	FQ-HF13	1	×	×	×	×
	Waste toner bottle	FFPQA0143	1	Replace at 4,000 copies. (for user replacement)			
	Cleaning blade	FFPHK0905	1		×		×

○: Cleaning ×: Replacement

*( ): Replacement cycle based low usage.

*: Service personal can amend this schedule by taking into account the percentage of paper passed through each paper port. We feel that this will ensure more effective copier maintenance and cost effectiveness for your customers.

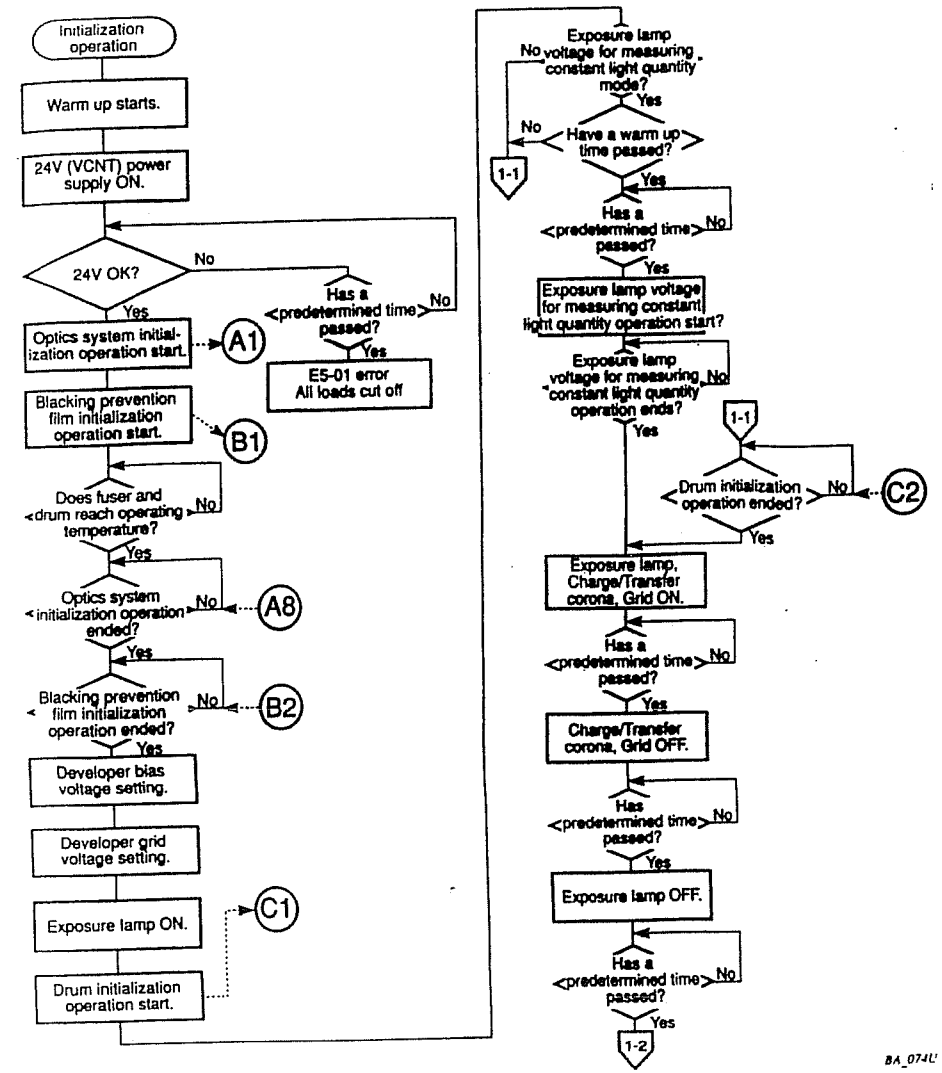
Item		Service / Part number	Q'ty per unit	(× 1000) 30	60	90	120
Fuser unit	Separation finger upper	FFPLK03131	4	○	○	○	○
	Thermistor	FFPBL0013	1	○	○	○	○
	Fuser lamp	H12V1KWN1A (for 120V ver.) H22V1KWN1A (for 220/240V ver.)	1				× 5,000 hours lamp on or machine on.
	Heat roller cleaner	FFPKM02784	1	Replace at 4,000 copies. (for user replacement)			
	Heat roller	FFPMA05241	1	○	×	○	×
	Pressure roller	FFPMA0523	1	○	×	○	×
Optics	Exposure lamp	E08V025WN2A (for 120V ver.) E16V025WN2A (for 220/240V ver.)	1				×
	No. 1 mirror	FFPGC0179	1				
	N0. 2 mirror	FFPGC0180	1				
	N0. 3 mirror	FFPGC0181	1				
	N0. 4 mirror	FFPGC0174	1	○	○	○	○
	N0. 5 mirror	FFPGC0182	1				
	N0. 6 mirror	FFPGC0183	1				
	Lens	FFPGA0042	1				
Main body	Dust protection filter	FFPHJ0034	1	○	○	○	○
	Ozone filter	FFPHJ00351	1		×		×
	Discharge lamp filter	FFPGB0021	1	○	○	○	○
	Transfer/Separation corona wire	FFPEY0064	1		×		×
	Transfer/Separation corona (with discharge saw)	FFPXF10D80	1	○	○	○	○
	Dust protection glass	FFPGC0184	1	○	○	○	○
	Platen glass	FFPGC0154	1	○	○	○	○
	Platen mat	FFPNN00361	1	○	○	○	○

○: Cleaning ×: Replacement

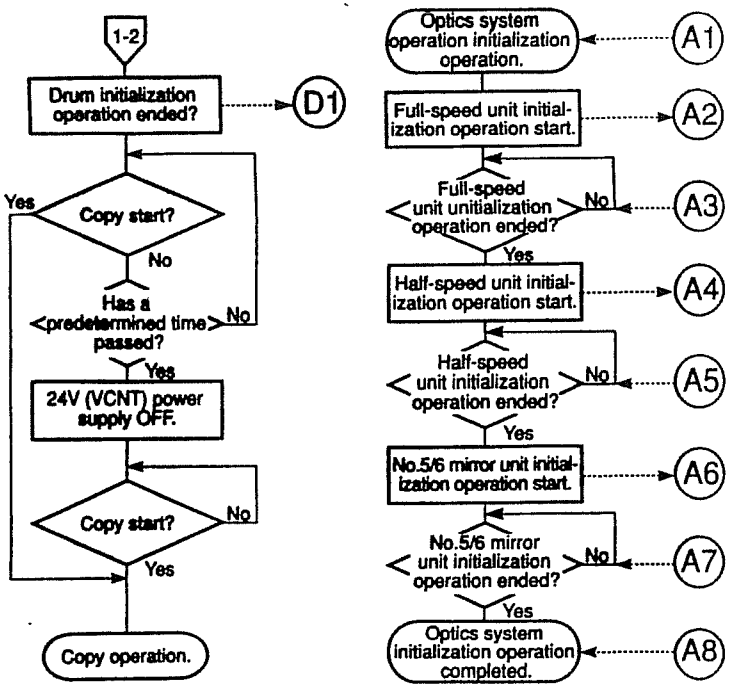
Section IV
Electrical

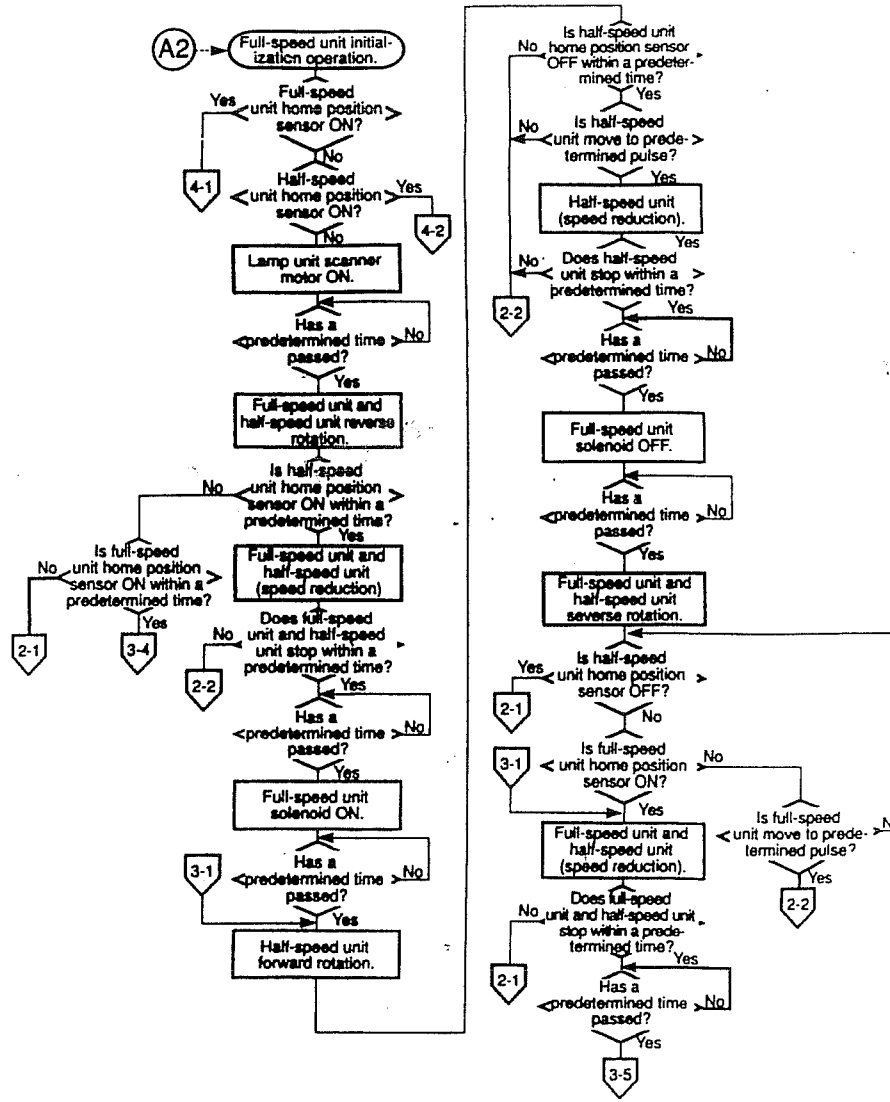
4.1 General flow chart

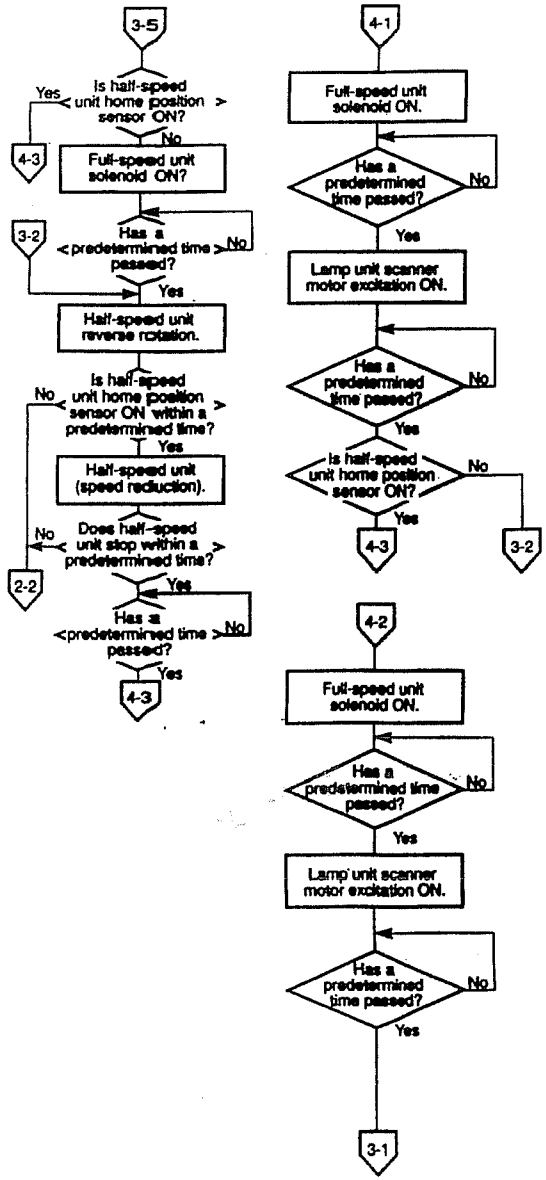
1. Power switch ON



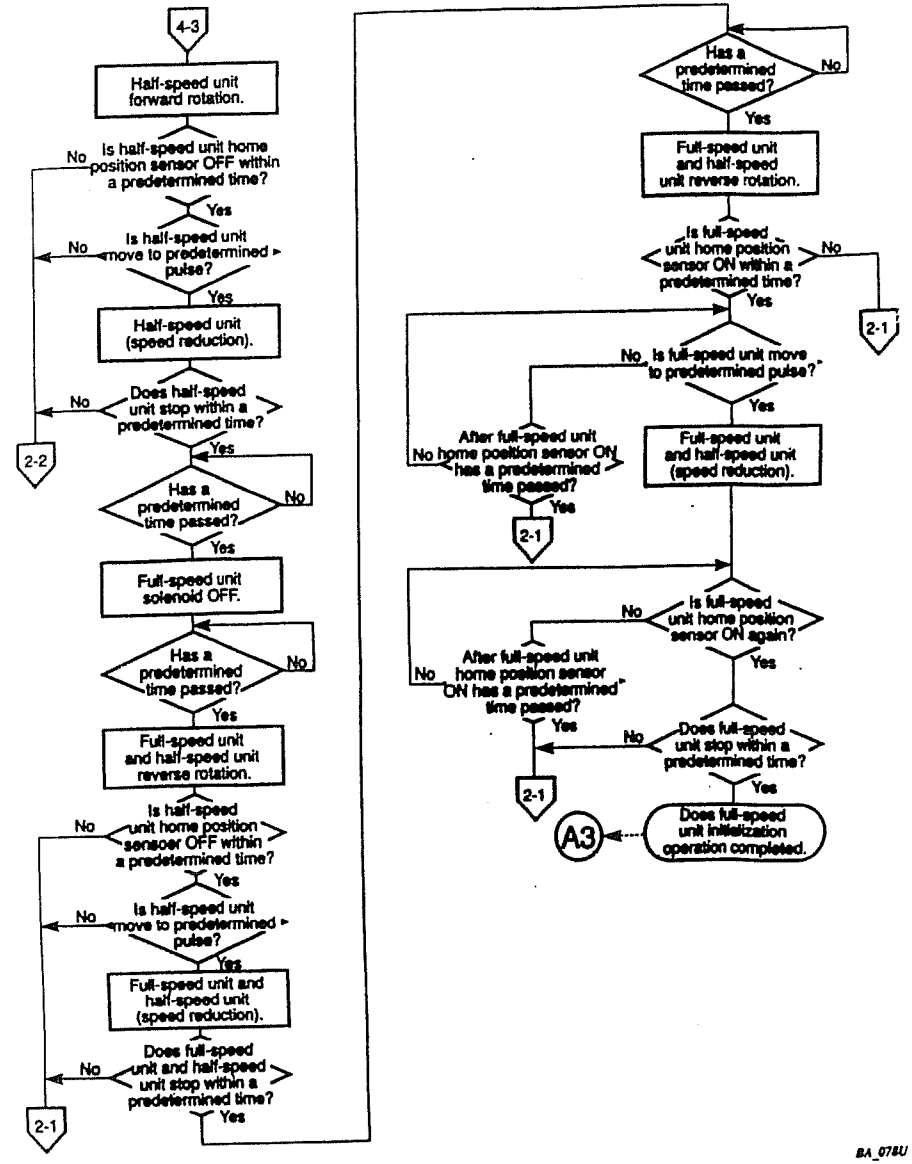
BA_074U


1-2
Drum initialization operation ended?
D1
Yes
Copy start?
No
Has a <predetermined time> passed?
No
Yes
24V (VCNT) power supply OFF.
Copy start?
No
Yes
Copy operation.
Optics system operation initialization operation.
A1
Full-speed unit initialization operation start.
A2
Full-speed unit unitialization operation ended?
No
A3
Yes
Half-speed unit initialization operation start.
A4
Half-speed unit initialization operation ended?
No
A5
Yes
No.5/6 mirror unit initialization operation start.
A6
No.5/6 mirror unit initialization operation ended?
No
A7
Yes
Optics system initialization operation completed.
A8
2-1
E1-01 error
All loads cut off
2-2
E1-21 error
All loads cut off
2-3
E1-22 error
All loads cut off
BA_075U

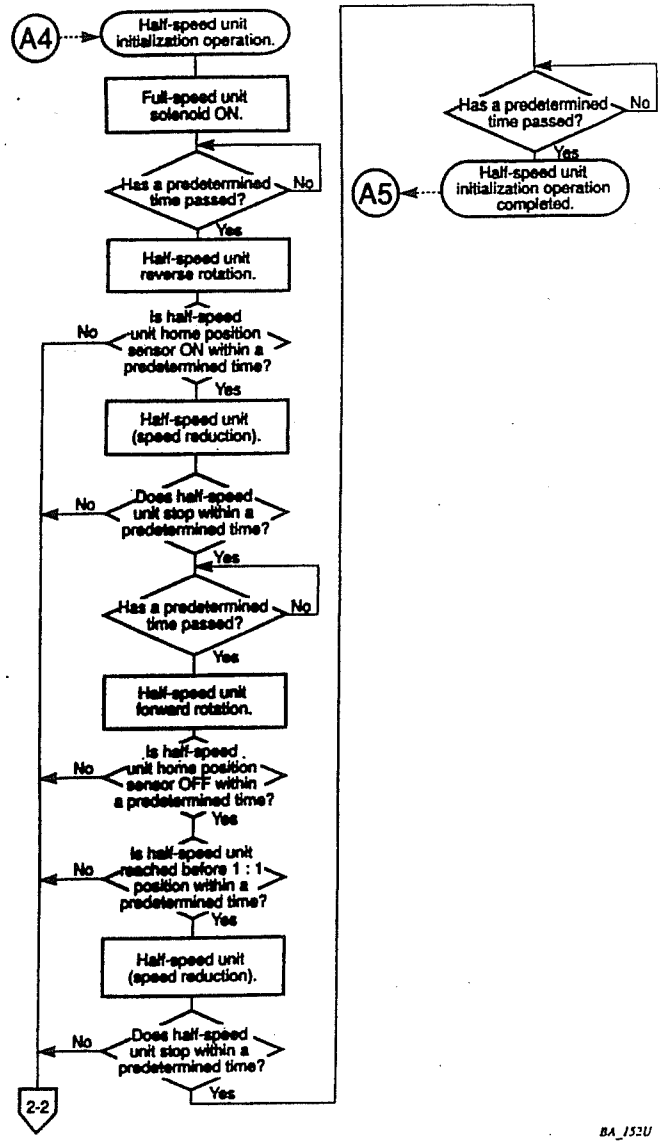

A2
Full-speed unit initialization operation.
Full-speed unit home position sensor ON?
Yes
No
4-1
Half-speed unit home position sensor ON?
Yes
No
4-2
Lamp unit scanner motor ON.
Has a <predetermined time> passed?
No
Yes
Full-speed unit and half-speed unit reverse rotation.
Is half-speed unit home position sensor ON within a predetermined time?
No
Yes
Is full-speed unit home position sensor ON within a predetermined time?
No
Yes
2-1
3-4
Full-speed unit and half-speed unit (speed reduction)
Does full-speed unit and half-speed unit stop within a predetermined time?
No
Yes
2-2
Has a <predetermined time> passed?
No
Yes
Full-speed unit solenoid ON.
Has a <predetermined time> passed?
No
Yes
3-1
Half-speed unit forward rotation.
Is half-speed unit home position sensor OFF within a predetermined time?
No
Yes
Is half-speed unit move to predetermined pulse?
No
Yes
Half-speed unit (speed reduction).
Does half-speed unit stop within a predetermined time?
No
Yes
2-2
Has a <predetermined time> passed?
No
Yes
Full-speed unit solenoid OFF.
Has a <predetermined time> passed?
No
Yes
Full-speed unit and half-speed unit severse rotation.
Is half-speed unit home position sensor OFF?
Yes
No
2-1
Is full-speed unit home position sensor ON?
No
Yes
3-1
Full-speed unit and half-speed unit (speed reduction).
Is full-speed unit move to predetermined pulse?
Yes
2-2
Does full-speed unit and half-speed unit stop within a predetermined time?
No
Yes
2-1
Has a <predetermined time> passed?
No
Yes
3-5

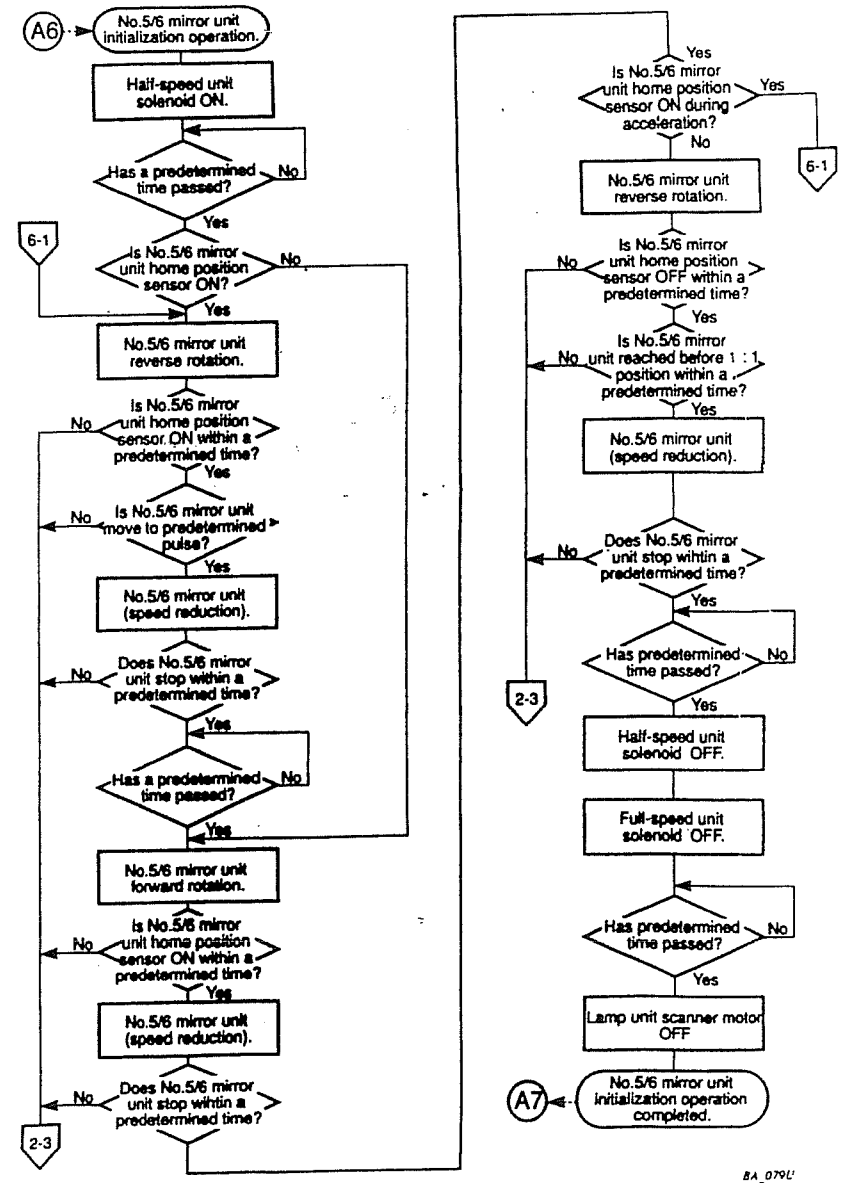


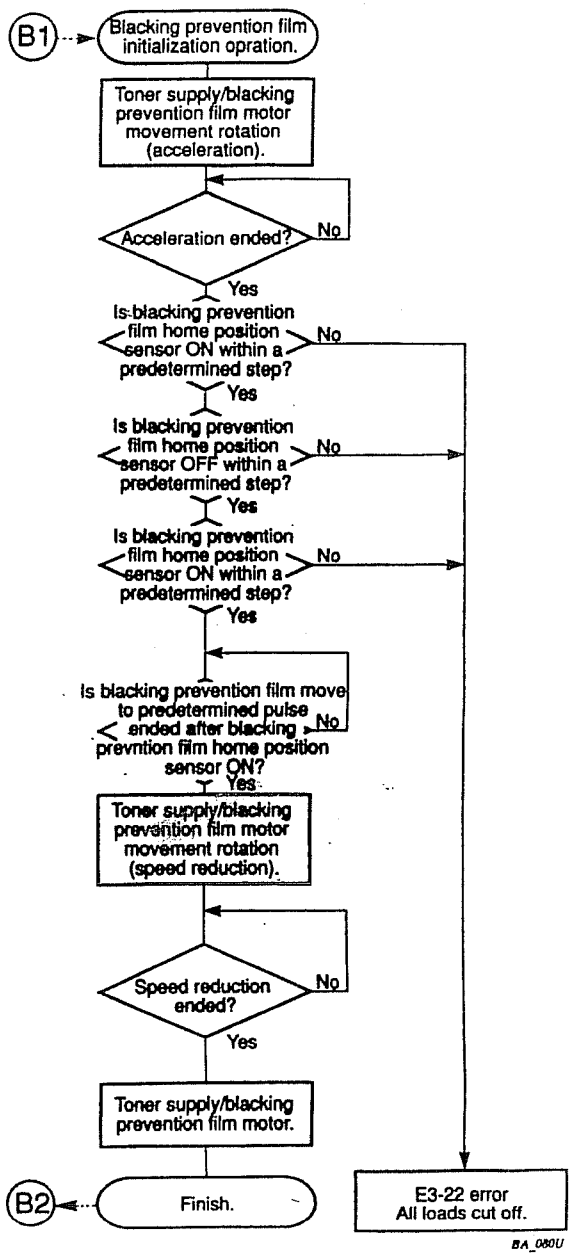
BA_077U

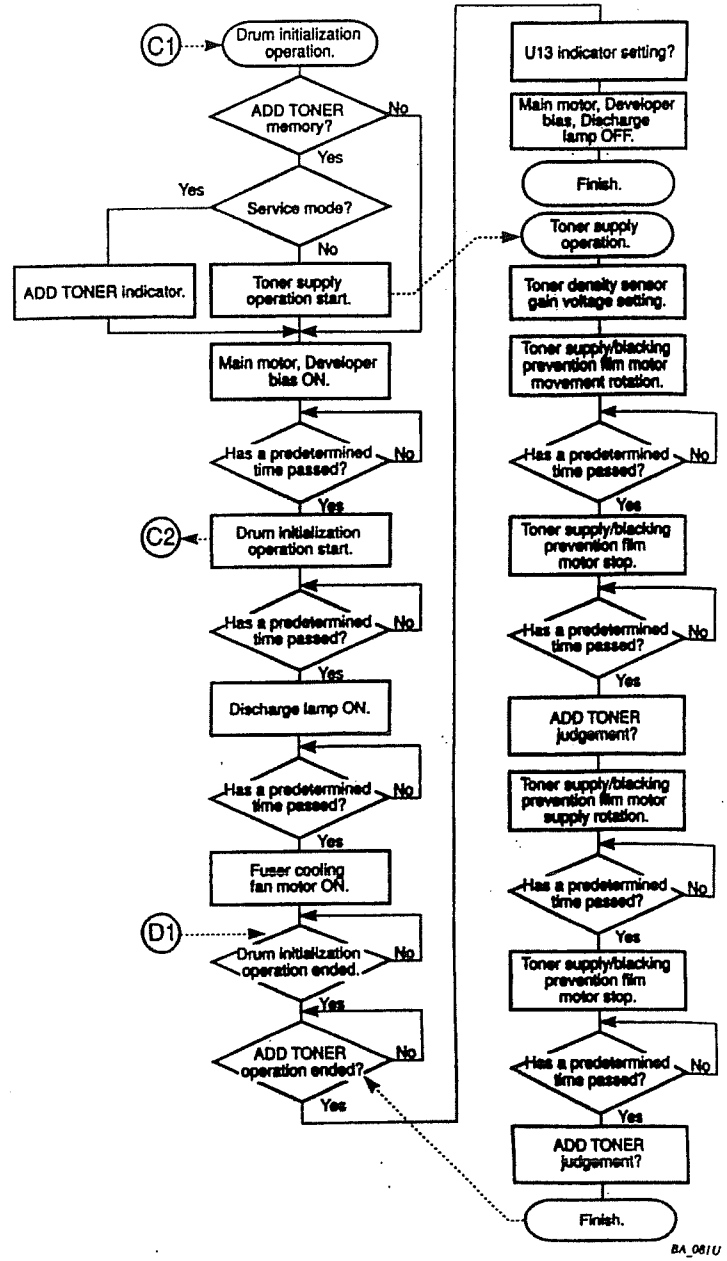


BA_078U

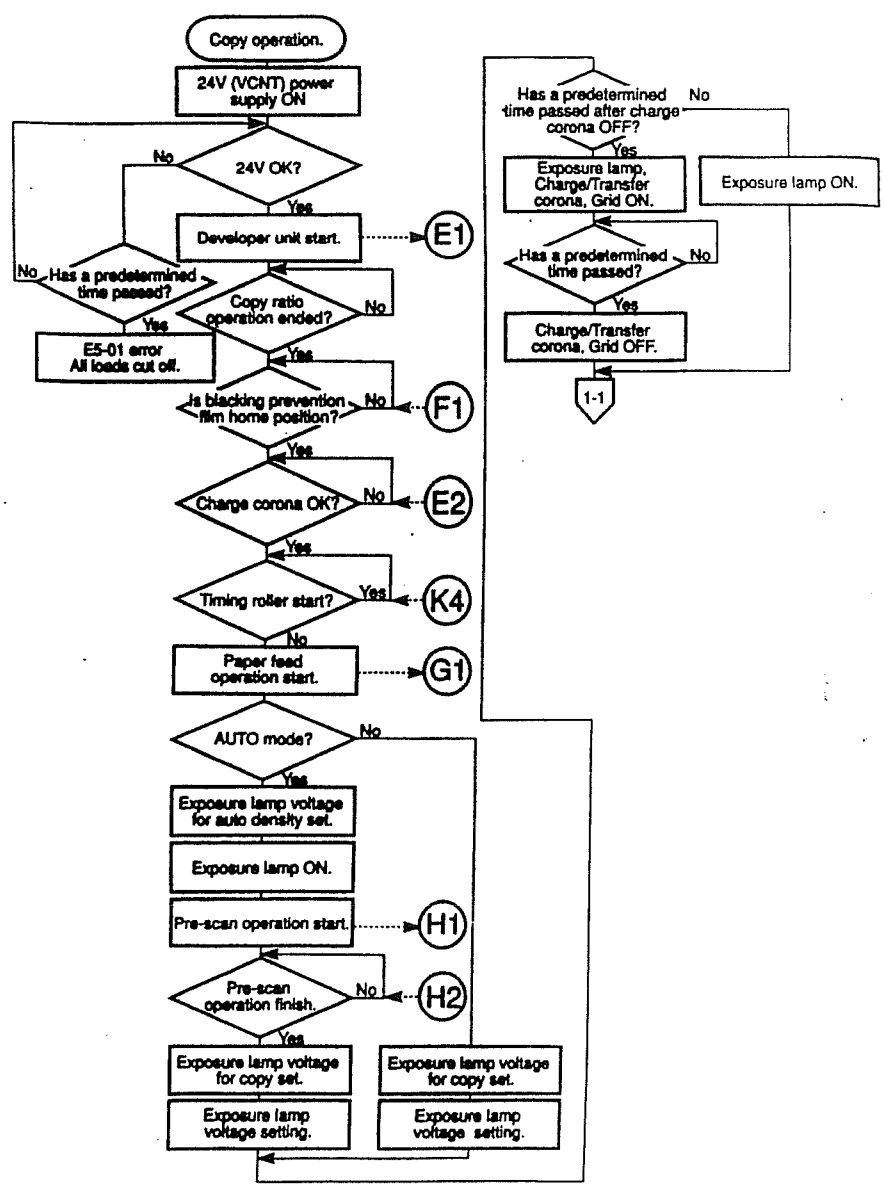

A4
Half-speed unit initialization operation.
Full-speed unit solenoid ON.
Has a predetermined time passed?
No
Yes
Half-speed unit reverse rotation.
Is half-speed unit home position sensor ON within a predetermined time?
No
Yes
Half-speed unit (speed reduction).
Does half-speed unit stop within a predetermined time?
No
Yes
Has a predetermined time passed?
No
Yes
Half-speed unit forward rotation.
Is half-speed unit home position sensor OFF within a predetermined time?
No
Yes
Is half-speed unit reached before 1 : 1 position within a predetermined time?
No
Yes
Half-speed unit (speed reduction).
Does half-speed unit stop within a predetermined time?
No
Yes
2-2
Has a predetermined time passed?
No
Yes
A5
Half-speed unit initialization operation completed.
BA_152U


A6
No.5/6 mirror unit initialization operation.
Half-speed unit solenoid ON.
Has a predetermined time passed?
No
Yes
6-1
Is No.5/6 mirror unit home position sensor ON?
No
Yes
No.5/6 mirror unit reverse rotation.
Is No.5/6 mirror unit home position sensor ON within a predetermined time?
No
Yes
Is No.5/6 mirror unit move to predetermined pulse?
No
Yes
No.5/6 mirror unit (speed reduction).
Does No.5/6 mirror unit stop within a predetermined time?
No
Yes
Has a predetermined time passed?
No
Yes
No.5/6 mirror unit forward rotation.
Is No.5/6 mirror unit home position sensor ON within a predetermined time?
No
Yes
No.5/6 mirror unit (speed reduction).
Does No.5/6 mirror unit stop within a predetermined time?
No
2-3
Yes
Is No.5/6 mirror unit home position sensor ON during acceleration?
Yes
No
6-1
No.5/6 mirror unit reverse rotation.
Is No.5/6 mirror unit home position sensor OFF within a predetermined time?
No
Yes
Is No.5/6 mirror unit reached before 1 : 1 position within a predetermined time?
No
Yes
No.5/6 mirror unit (speed reduction).
Does No.5/6 mirror unit stop within a predetermined time?
No
Yes
Has predetermined time passed?
No
Yes
2-3
Half-speed unit solenoid OFF.
Full-speed unit solenoid OFF.
Has predetermined time passed?
No
Yes
Lamp unit scanner motor OFF
A7
No.5/6 mirror unit initialization operation completed.
BA_079U

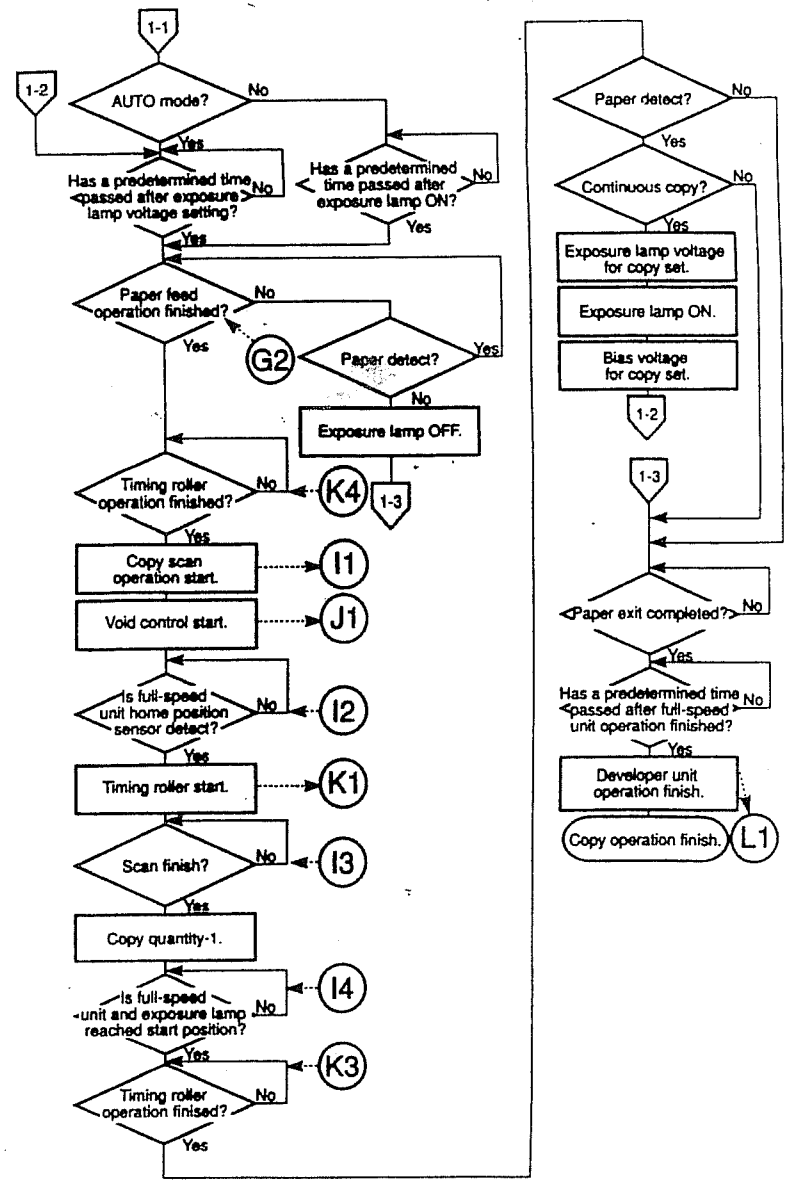

B1
Blacking prevention film initialization opration.
Toner supply/blacking prevention film motor movement rotation (acceleration).
Acceleration ended?
No
Yes
Is blacking prevention film home position sensor ON within a predetermined step?
No
Yes
Is blacking prevention film home position sensor OFF within a predetermined step?
No
Yes
Is blacking prevention film home position sensor ON within a predetermined step?
No
Yes
Is blacking prevention film move to predetermined pulse ended after blacking prevntion film home position sensor ON?
No
Yes
Toner supply/blacking prevention film motor movement rotation (speed reduction).
Speed reduction ended?
No
Yes
Toner supply/blacking prevention film motor.
B2
Finish.
E3-22 error
All loads cut off.
BA_080U


C1
Drum initialization operation.
ADD TONER memory?
No
Yes
Yes
Service mode?
No
ADD TONER indicator.
Toner supply operation start.
Main motor, Developer bias ON.
Has a predetermined time passed?
No
Yes
C2
Drum initialization operation start.
Has a predetermined time passed?
No
Yes
Discharge lamp ON.
Has a predetermined time passed?
No
Yes
Fuser cooling fan motor ON.
D1
Drum initialization operation ended.
No
Yes
ADD TONER operation ended?
No
Yes
U13 indicator setting?
Main motor, Developer bias, Discharge lamp OFF.
Finish.
Toner supply operation.
Toner density sensor gain voltage setting.
Toner supply/blacking prevention film motor movement rotation.
Has a predetermined time passed?
No
Yes
Toner supply/blacking prevention film motor stop.
Has a predetermined time passed?
No
Yes
ADD TONER judgement?
Toner supply/blacking prevention film motor supply rotation.
Has a predetermined time passed?
No
Yes
Toner supply/blacking prevention film motor stop.
Has a predetermined time passed?
No
Yes
ADD TONER judgement?
Finish.
BA_081U

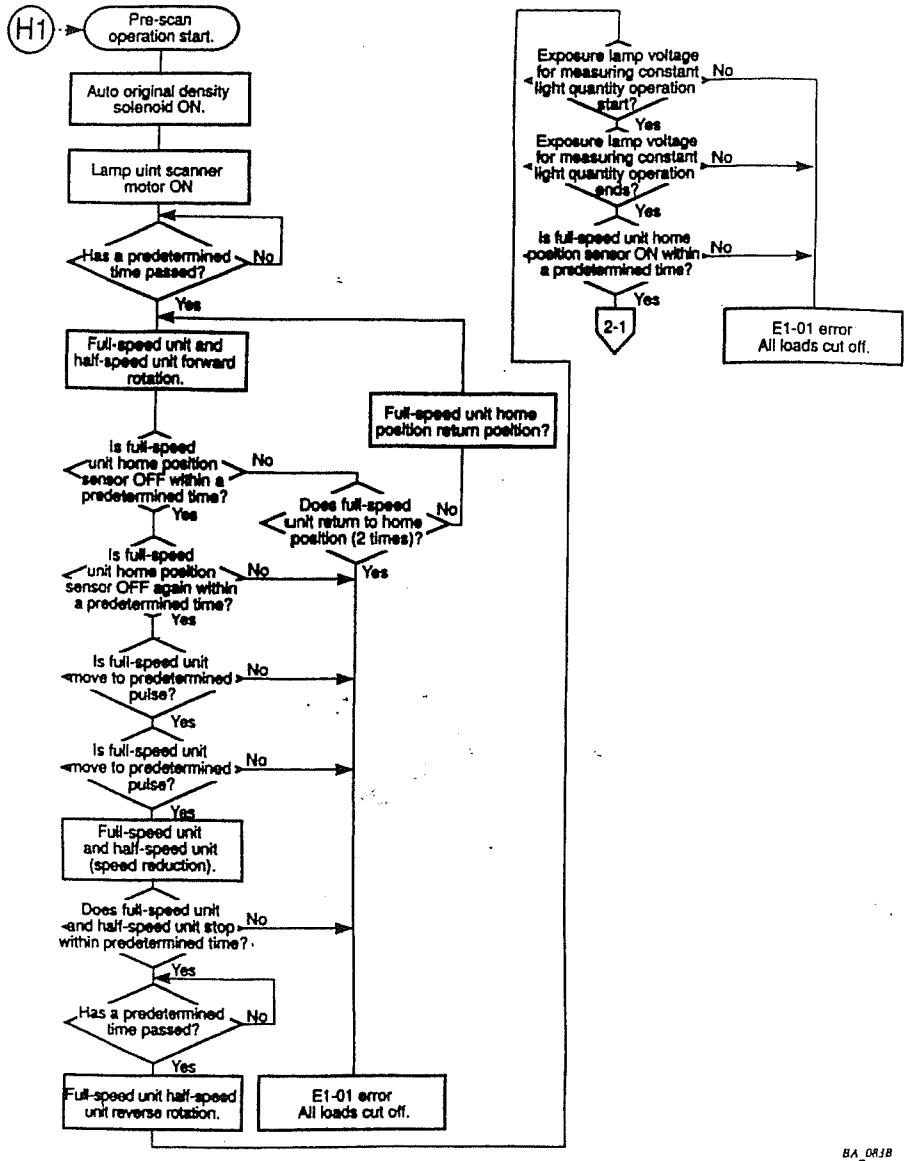
2. Copy operation



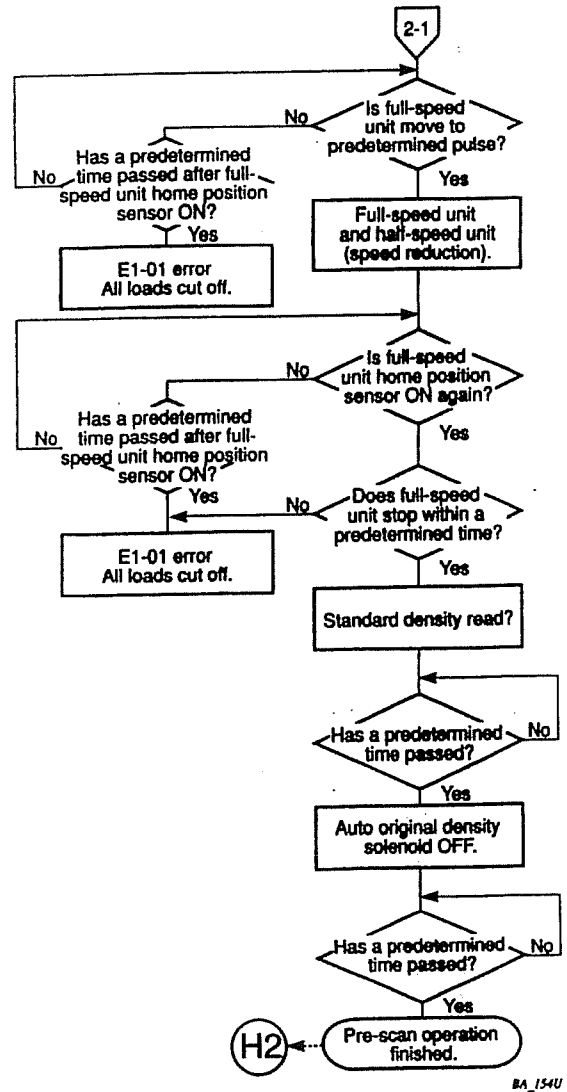
BA_082C



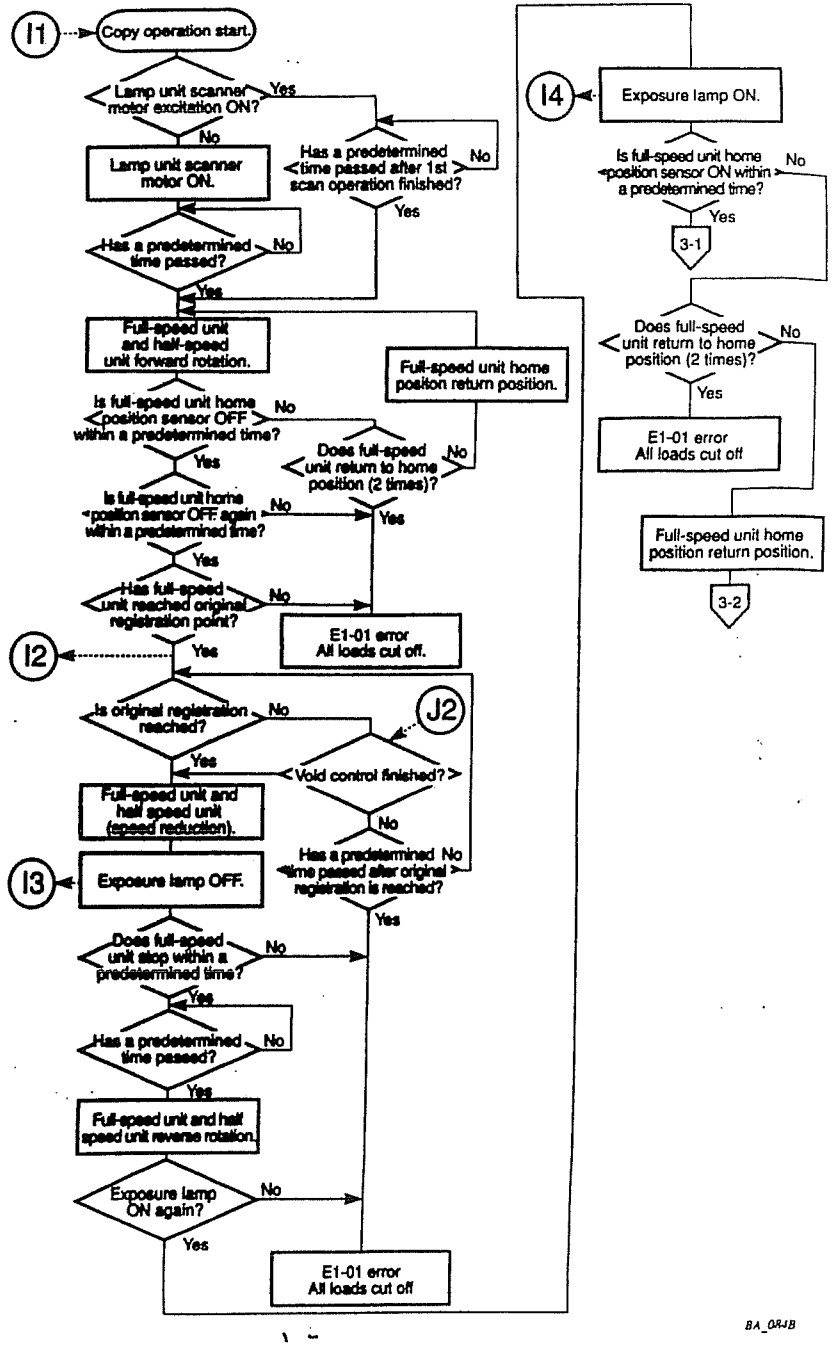
BA_153C



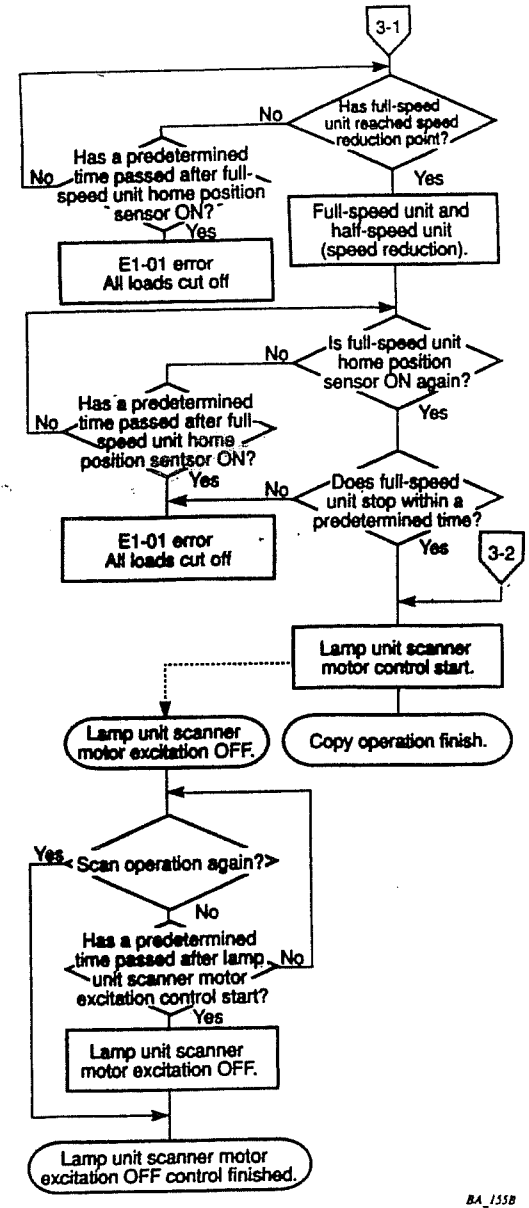
BA_0R3B



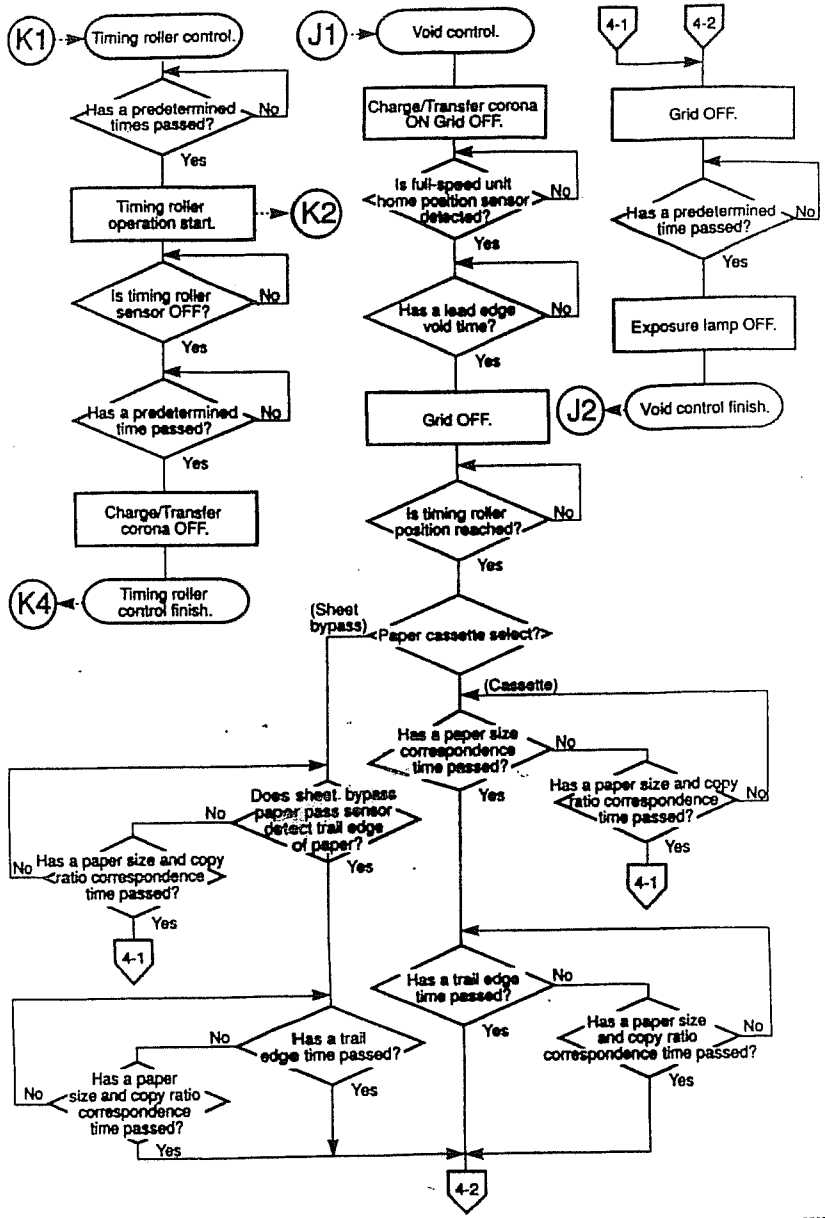
BA_154U

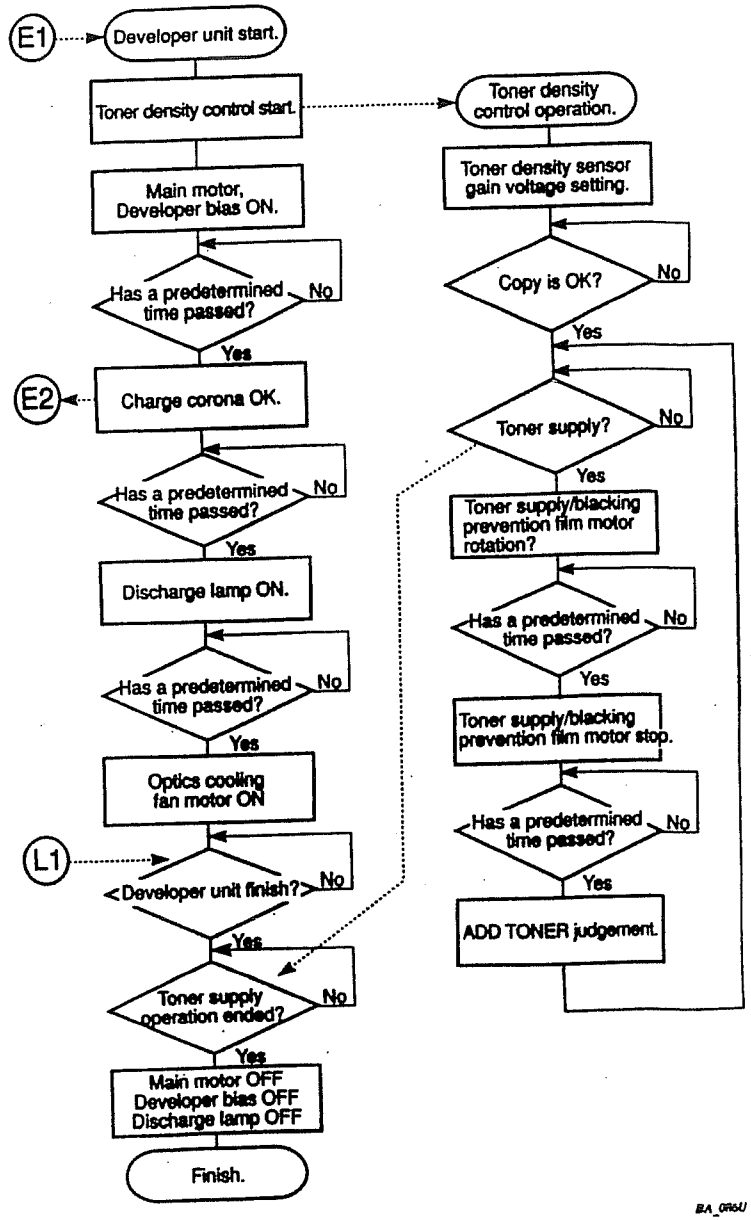


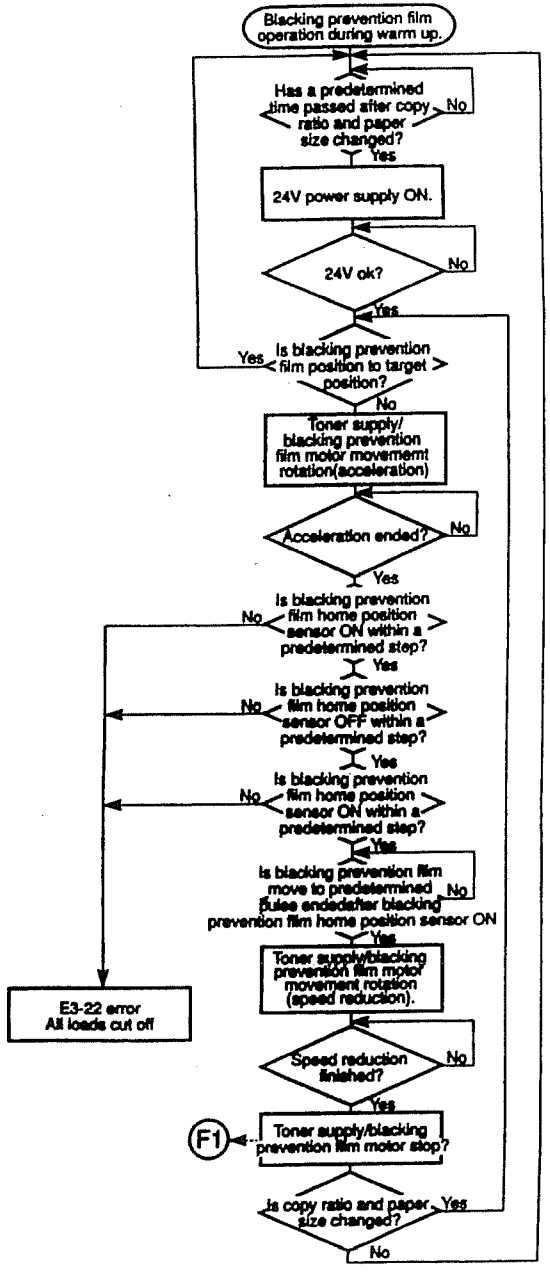
BA_0R4B

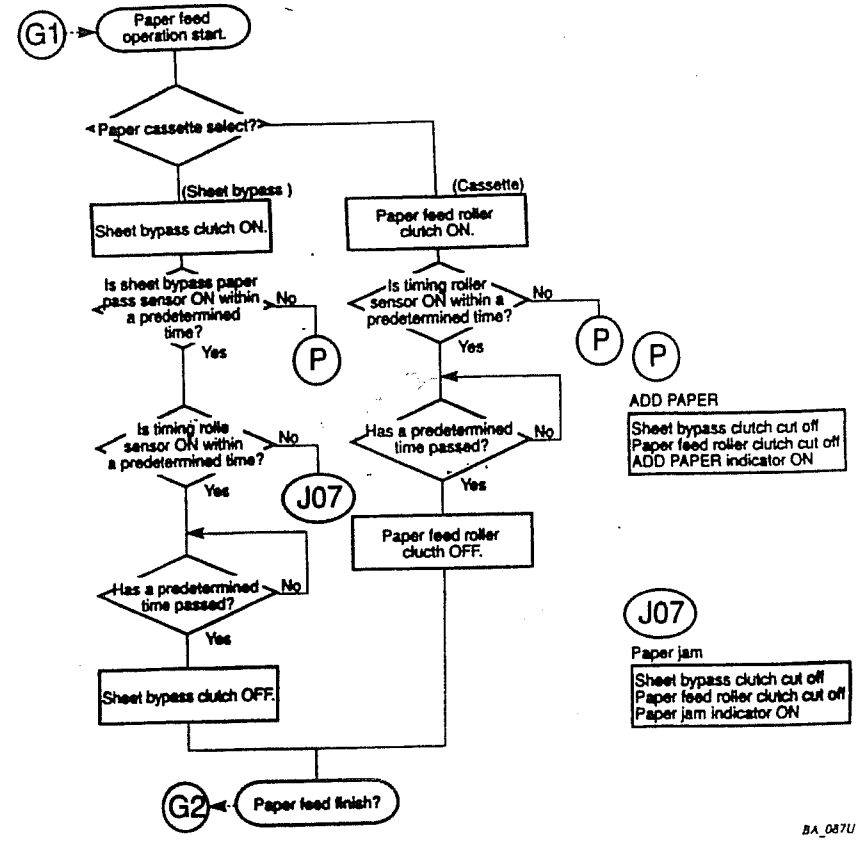


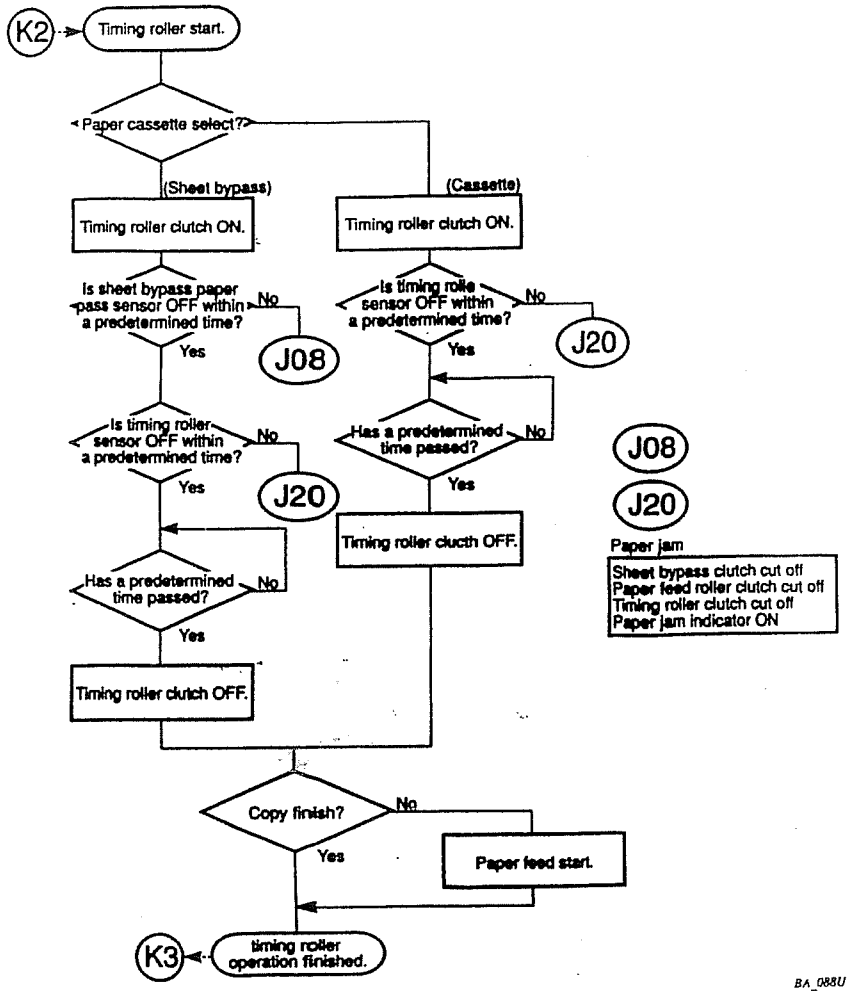
BA_155B


K1
Timing roller control.
Has a predetermined times passed?
No
Yes
Timing roller operation start.
K2
Is timing roller sensor OFF?
No
Yes
Has a predetermined time passed?
No
Yes
Charge/Transfer corona OFF.
K4
Timing roller control finish.
J1
Void control.
Charge/Transfer corona ON Grid OFF.
Is full-speed unit <home position sensor detected?
No
Yes
Has a lead edge void time?
No
Yes
Grid OFF.
Is timing roller position reached?
No
Yes
(Sheet bypass)
Paper cassette select?>
(Cassette)
Has a paper size correspondence time passed?
No
Yes
Has a paper size and copy ratio correspondence time passed?
No
Yes
4-1
Does sheet bypass paper pass sensor detect trail edge of paper?
No
Yes
No
Has a paper size and copy ratio correspondence time passed?
Yes
4-1
Has a trail edge time passed?
No
Yes
No
Has a trail edge time passed?
Yes
No
Has a paper size and copy ratio correspondence time passed?
Yes
No
Has a paper size and copy ratio correspondence time passed?
Yes
4-2
4-1
4-2
Grid OFF.
Has a predetermined time passed?
No
Yes
Exposure lamp OFF.
J2
Void control finish.
BA_085U


E1
Developer unit start.
Toner density control start.
Main motor, Developer bias ON.
Has a predetermined time passed?
No
Yes
E2
Charge corona OK.
Has a predetermined time passed?
No
Yes
Discharge lamp ON.
Has a predetermined time passed?
No
Yes
Optics cooling fan motor ON
L1
<Developer unit finish?
No
Yes
Toner supply operation ended?
No
Yes
Main motor OFF
Developer bias OFF
Discharge lamp OFF
Finish.
Toner density control operation.
Toner density sensor gain voltage setting.
Copy is OK?
No
Yes
Toner supply?
No
Yes
Toner supply/blacking prevention film motor rotation?
Has a predetermined time passed?
No
Yes
Toner supply/blacking prevention film motor stop.
Has a predetermined time passed?
No
Yes
ADD TONER judgement.
BA_086U


Blacking prevention film operation during warm up.
Has a predetermined time passed after copy ratio and paper size changed?
No
Yes
24V power supply ON.
24V ok?
No
Yes
Yes
Is blacking prevention film position to target position?
No
Toner supply/ blacking prevention film motor movement rotation(acceleration)
Acceleration ended?
No
Yes
No
Is blacking prevention film home position sensor ON within a predetermined step?
Yes
No
Is blacking prevention film home position sensor OFF within a predetermined step?
Yes
No
Is blacking prevention film home position sensor ON within a predetermined step?
Yes
Is blacking prevention film move to predetermined pulse endedafter blacking prevention film home position sensor ON
No
Yes
Toner supply/blacking prevention film motor movement rotation (speed reduction).
E3-22 error
All loads cut off
Speed reduction finished?
No
Yes
F1
Toner supply/blacking prevention film motor stop?
Is copy ratio and paper size changed?
Yes
No
BA_151U


G1
Paper feed operation start.
Paper cassette select?
(Sheet bypass)
(Cassette)
Sheet bypass clutch ON.
Paper feed roller clutch ON.
Is sheet bypass paper pass sensor ON within a predetermined time?
No
Yes
Is timing roller sensor ON within a predetermined time?
No
Yes
P
P
P
ADD PAPER
Sheet bypass clutch cut off
Paper feed roller clutch cut off
ADD PAPER indicator ON
Is timing rolle sensor ON within a predetermined time?
No
Yes
J07
Has a predetermined time passed?
No
Yes
Paper feed roller clucth OFF.
Has a predetermined time passed?
No
Yes
J07
Paper jam
Sheet bypass clutch cut off
Paper feed roller clutch cut off
Paper jam indicator ON
Sheet bypass clutch OFF.
G2
Paper feed finish?
BA_087U



BA_088U

4.2 General (PCBs)

Listed below are PCBs (Printed Circuit Boards) and major electrical components along with a brief description of their operation and functions.

1. **CPU PCB**
   The CPU PCB performs the majority of machine logic. The CPU PCB uses one microprocessor to perform electrical/mechanical sequence operations. This PCB controls the microprocessor circuit, exposure lamp circuit, fuser temperature control circuit. The triangular wave circuit controls the exposure level. The stepping motor drive control input (ON/OFF, Forward/Reverse, Copy size ratio signal) are on the CPU PCB and perform the related high power switching. The CPU PCB is supplied with +24VDC from the LVPS PCB to regulate a +10VDC circuit to operate the CPU.

2. **Low voltage power supply PCB**
   This board supplies low voltage. The low voltage power supply circuits supply stabilized +5VDC and +24VDC. +5VDC operates CPU PCB. The +24VDC operates solenoids, main motor and lens unit scanner motor. This board supplies the operational circuits for the exposure lamp, and fuser lamp. The zero cross generation circuit is supplied to the CPU PCB.

3. **High voltage power supply PCB**
   The high voltage power supply has six functions. It supplies the charge corona (for Document and Photo mode) and transfer corona with high voltage DC, and the magnetic brush with a bias voltage. It also supplies grid voltage and shield current. It supplies the Discharge saw with high voltage DC.

4. **Optics driver PCB**
   This PCB controls the lamp unit scanner motor drive circuit, fan motor, each sensor and each solenoid for the copy ratio control circuit.

5. **Control panel PCB**
   Control panel for the LED section allows the operator to monitor the operation of the copier. It indicates for example, the selected amount of copies, selected paper size, zoom, copy ratio, and selected exposure lamp levels, etc, using the LED display and appropriate keys.

4.3 Description of circuits

1. Triangular wave generating circuit

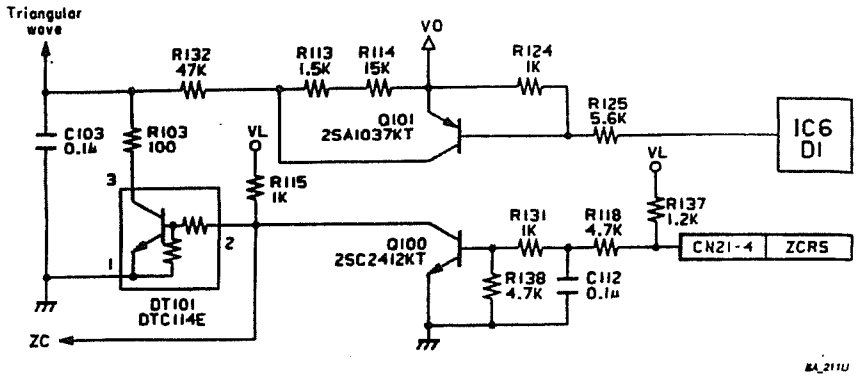


Figure 4-22-1

The CPU PCB generates triangular waves that are synchronized with the power supply wave forms (two times the frequency) and supplied to the exposure lamp control circuit to perform phase control. The circuit construction is shown in figure 4-22-1. ZCRS is a full-wave rectified AC pulse with a frequency twice the power supply frequency. Q100 and DT101 are turned ON/OFF by ZCRS, while the triangular waves are generated by the intergrated circuit comprised of R113, R114, R132 and C103. Frequency control signal is always "Low" level and Q102 is always a "ON". The operational time of the triangular wave generating circuit is shown in figure 4-22-2.

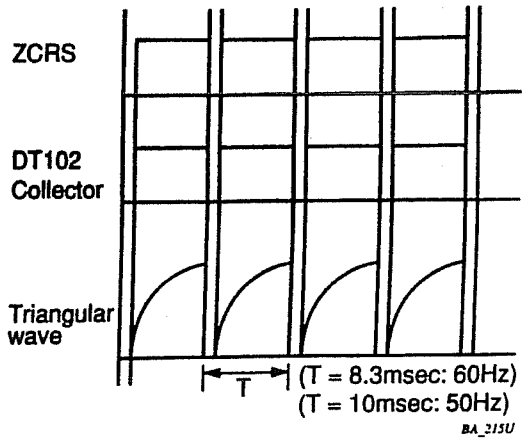


Figure 4-22-2

2. Fuser temperature control circuit

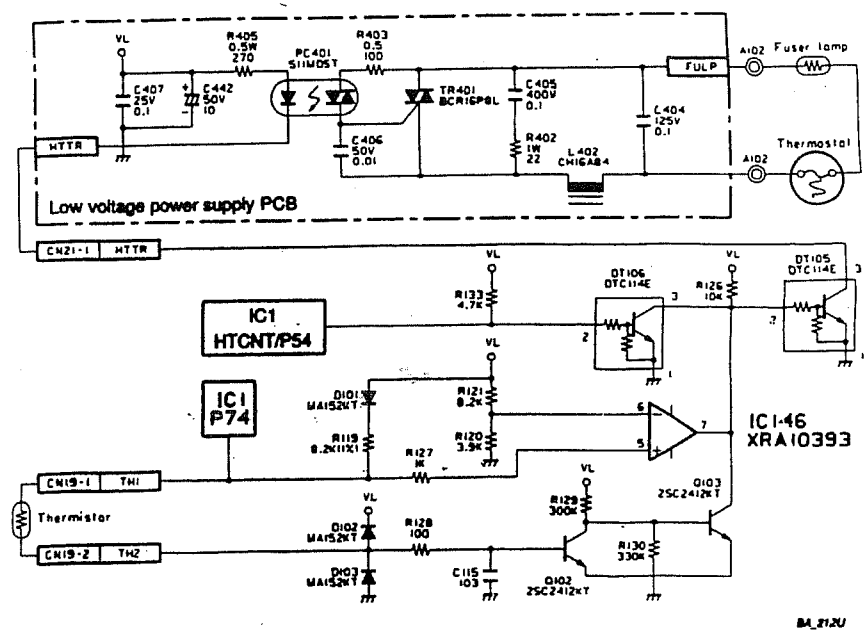


Figure 4-23-1

The CPU PCB fuser temperature control circuit turns the fuser lamp on when the fuser temperature falls below the specified temperature and turns the lamp off when it exceeds the operating temperature. The functions of this circuit are:

- Fuser temperature control.
- Detection of thermistor circuit.
- Turns the fuser off during a copier malfunction.

If the fuser temperature drops below the set level, a "High" level signal is output through terminal HTCNT of IC1, the transistor ("High" level ON) of DT105 turns ON, and the fuser lamp is turned on by the operation of PC401 on low voltage power supply PCB. As the fuser temperature reaches its set level, terminal HTCNT of IC1 is switched to a "Low" level by the change in resistance of the thermistor.

Transistor DT105 turns OFF, and the fuser lamp goes out. In this way, the fuser temperature is maintained at a constant level. The temperature is detected by the thermistor by inputting the voltage (+5V) that is generated as a power supply into IC1.

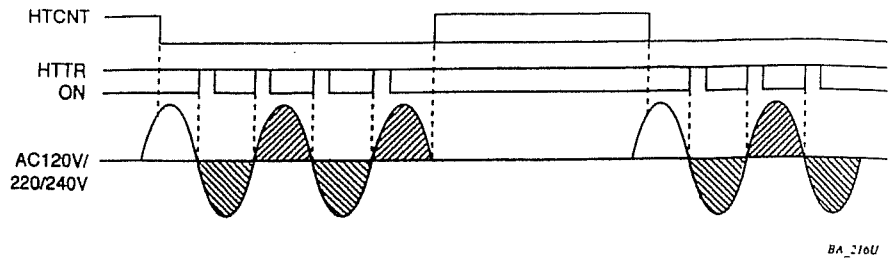


Figure 4-24-1

If the thermistor develops burnout, transistor Q102 turns OFF, transistor Q103 turns ON, and the base(B) of DT105 becomes a "Low" level, ensuring that transistor DT105 doesn't turn ON and prevents the fuser lamp from lighting. If fuser temperature rises abnormally due to faults (other than burnout) of the thermistor, etc, the change in voltage (inverse input terminal side) of the positive terminal of IC146 causes the base(B) of DT105 to become a "Low" level, preventing transistor DT105 from turning ON and turning OFF the fuser lamp and therefore protects the fuser unit from damage.

3. Exposure lamp control circuit

The CPU PCB controls the ON/OFF signal and intensity of the exposure lamp. The ON/OFF signal from the CPU is IC2(LPCNT1) (Exposure lamp control signal). When the PRINT key is pressed, the exposure lamp control signal goes "High" until the end of scan. During return scan, the exposure lamp control signal is "Low" until copy end.
Transformer (T401) is connected in parallel with the exposure lamp and feeds back the applied voltage signal on the exposure lamp to the CPU PCB. The circuit construction is shown in figure 4-25-1.

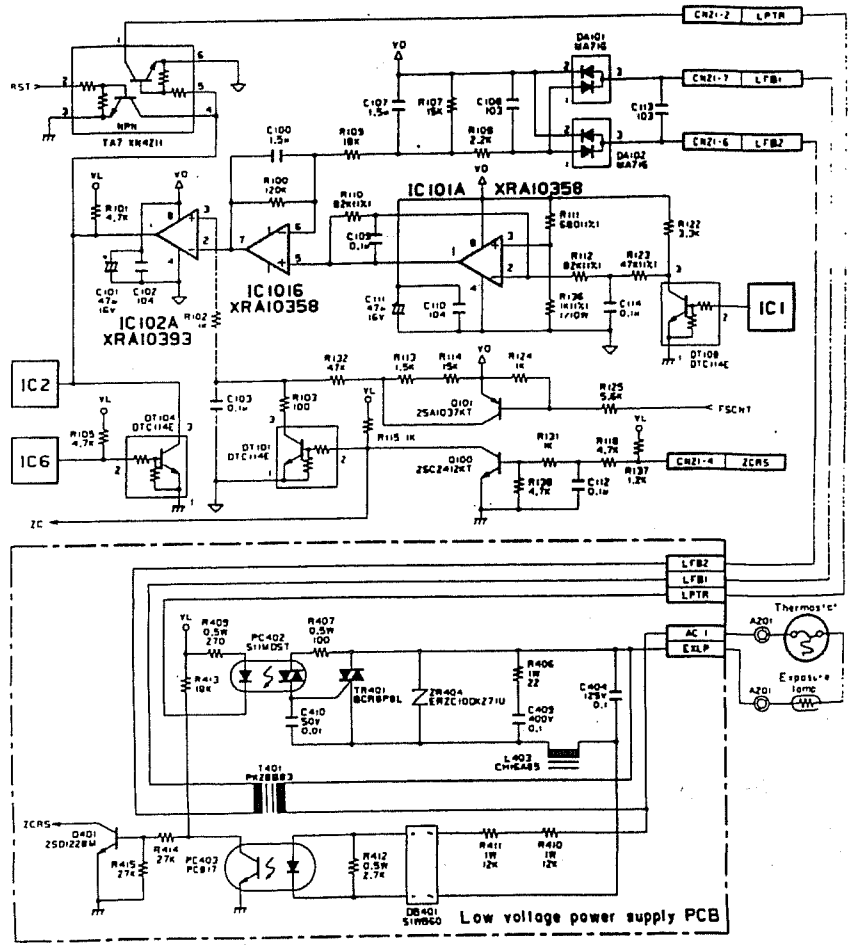


Figure 4-25-1

The secondary voltage of the transformer is full wave-rectified by DA101 and DA102 after being divided by R107 and R108 and filtered by C102 into DC waveforms. One of the DC waveforms is connected to +10V, and the other is connected to the non-inverted input terminal of IC1016 (opamplifier) through R109.

When TA7 turns ON, PC402 is activated to light the exposure lamp. The light exposure amount is varied by varying the signal sent from IC2 by means of the voltage at the inverted input terminal of IC101A. A change in the exposure amount occurs in the following cases.

a. When the exposure control keys on the control panel are pressed.
b. When the PHOTO Mode key on control panel is selected.
c. When reduction, 1:1 and enlargement keys are pressed.

IC1016 amplified voltage goes to the inverted input terminal of IC102A, then it is compared with the triangular waveforms at the non-inverted input terminal of IC102A. The output of IC102A, an open collector type comparator pulled up by R105, enters into the base of TA7. When TA7 is in the ON state, the exposure lamp lights. In normal operation, when the exposure lamp control signal is "High", LPTR (Trigger signal for exposure lamp) is transmitted by switching TA7 from the output of IC102A. The operational time of exposure lamp control circuit is shown in figure 4-26-1.

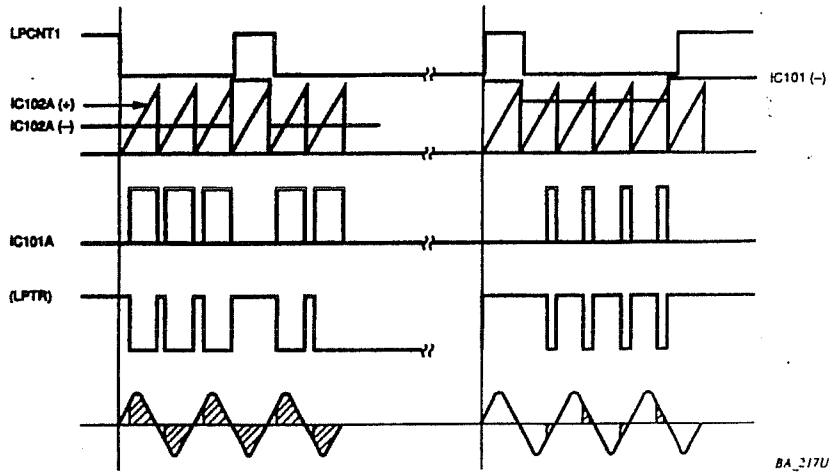


Figure 4-26-1

4. Auto original density control circuit

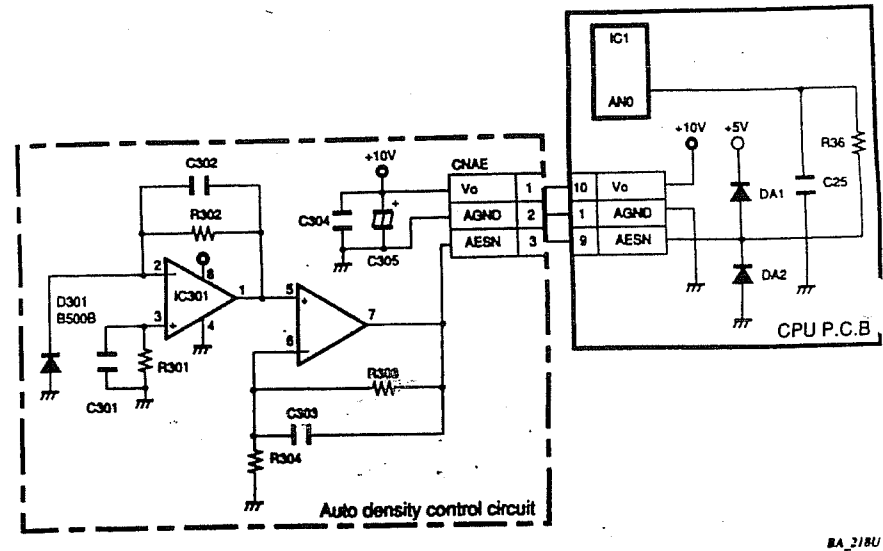


Figure 4-27-1

This circuit of the CPU PCB detects the original density by comparing the signal received from the auto original density sensor with the reference voltage. It reads the light reflected from original during pre-scan with the sensor of D301 and outputs it as AESN (Auto original density sensor signal). If the original density is dark, the output of the auto original density sensor goes "Low". If the original density is light, it goes "High"; AESN is output, and it is then input into AN1 of IC1. In this way, the density levels of the original and reference pattern are read, computation is performed, and the exposure level is regulated accordingly, and image density is controlled.

5. Main motor control circuit

This circuit is located on the main motor. The main motor is controlled by (PLL) phase comparison, according to the reference frequency prepared by the crystal oscillator. Figure 4-29-1 shows a block diagram of IC, Figure 4-28-1 shows a circuit diagram and Figure 4-30-1 shows a waveform. The speed sensor matched to the speed of the main motor, is input and waveform shaping (waveform of Ⓐ) into ④ and ⑤ of IC. This pulse is signal-processed inside the IC; if the speed is fast, the analog voltage of ㉖ rises; if slow, it drops (waveform of Ⓑ). This analog voltage is compared with a chopping wave (waveform of Ⓒ), and the drive circuit is kept ON, allowing current to flow to the motor until the voltage of the chopping wave becomes higher. As a result, the duty of the output becomes small, supplying additional current to the motor, when the load of the motor is heavy (waveform of Ⓔ). Because the main motor is a brushless motor, the rotor position is detected by the built-in hall element H1, H2 and H3 and the electric current of each phase is sent in order. Consequently, the output waveform of ⑧, ⑨, and ⑩ drivers are matched to the waveform of Ⓕ of Figure 4-30-1. The duty becomes large, supplying less current to the motor when the load is light. The current control circuit in the Ⓖ of Figure 4-29-1 ensures that no more than 3A of current flows to the motor, when it starts or if the motor is in a locked condition. When the motor is stopped, the CPU sets the MMCNT high, and turns OFF the drive circuit. If the frequency of the speed sensor of waveform of Ⓐ of Figure 4-30-1 is within ± 6% of the prescribed value, the MMLCK goes "Low", while others turn "High". If the motor speed becomes abnormal, the CPU detects this signal and displays machine error.

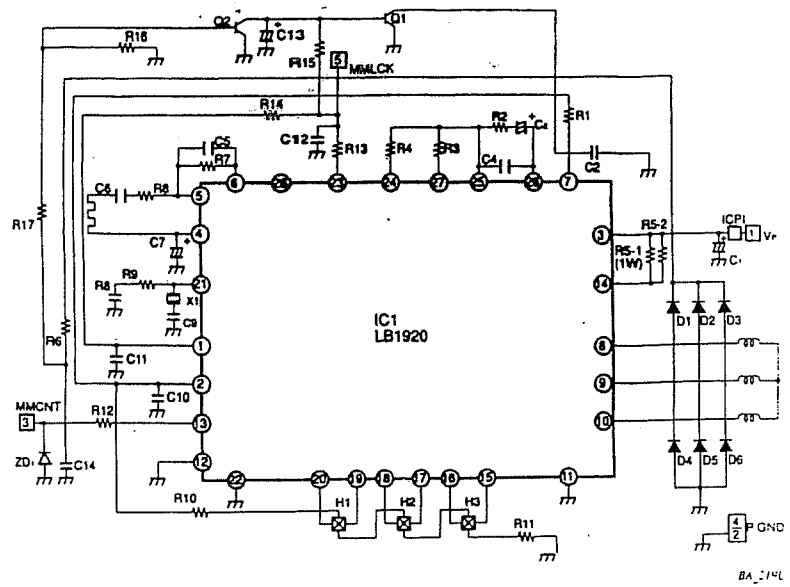


Figure 4-28-1

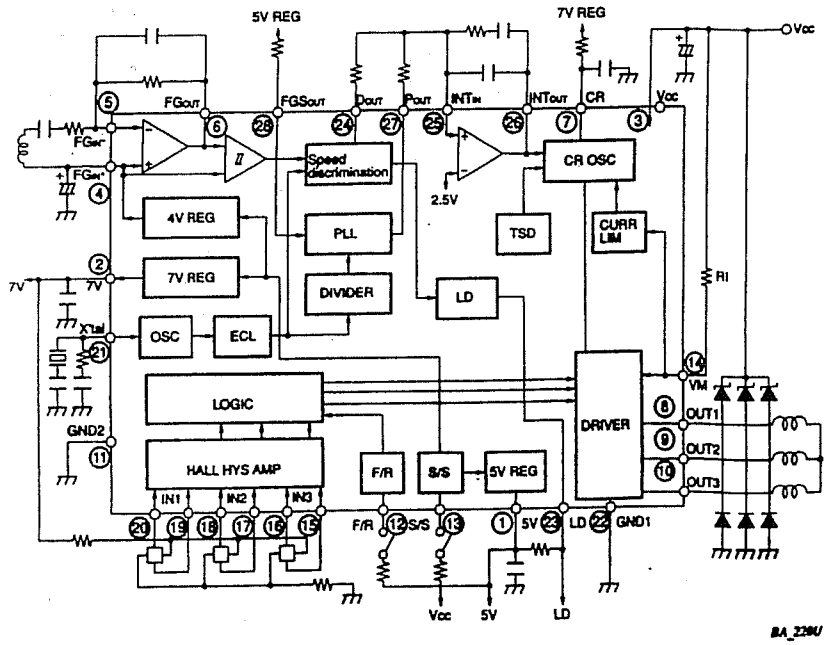


Figure 4-29-1

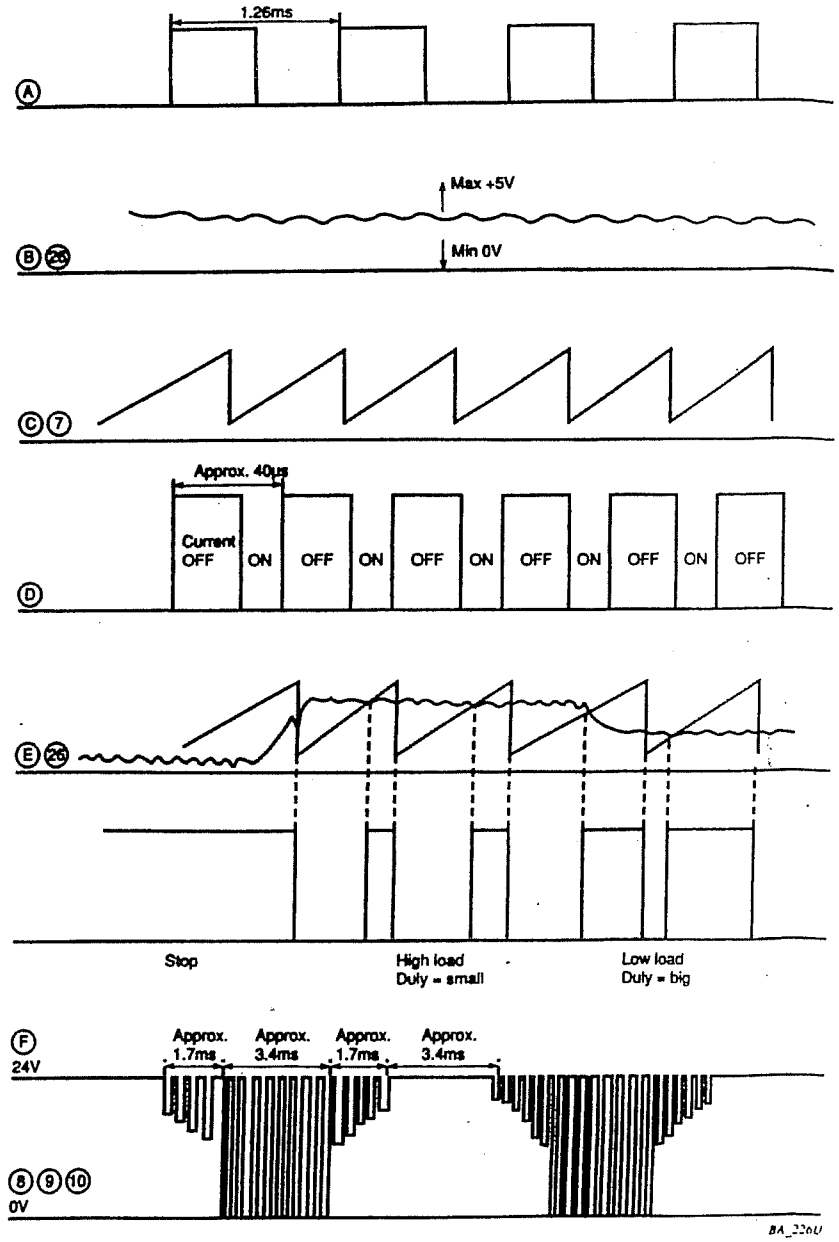


Figure 4-30-1

6. Lamp unit scanner motor control circuit

The lamp unit scanner motor is a 4-phase stepping motor driven by constant-current. A block diagram of this circuit is shown in Figure 4-31-2. The steppin motor is rotated by exciting phases A→B→$\bar{A}$→$\bar{B}$, in this order. By exciting phases in reverse order, the motor rotates in the reverse direction (Figure 4-32-1). In the driver of IC651, the set value of current is determined by the reference voltage that is divided by R659 and R661. If the motor current exceeds this set current value at the time of motor excitation, the driver turns OFF.

Excitation is done by repeatedly turning the driver ON/OFF in this way (Figur 4-32-2).

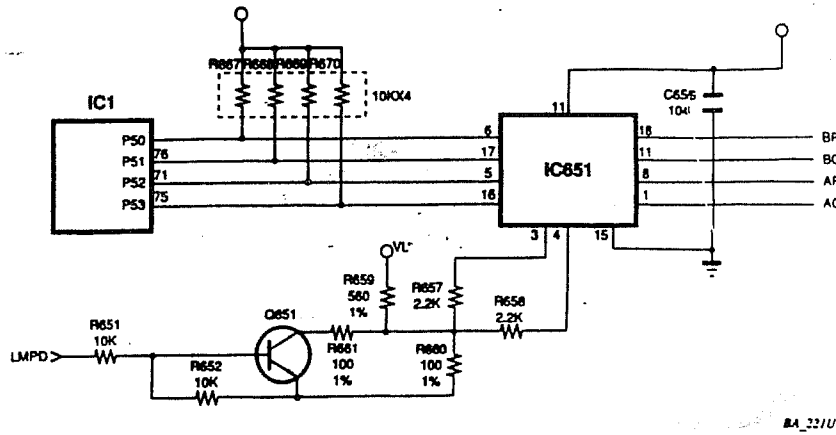


Figure 4-31-1

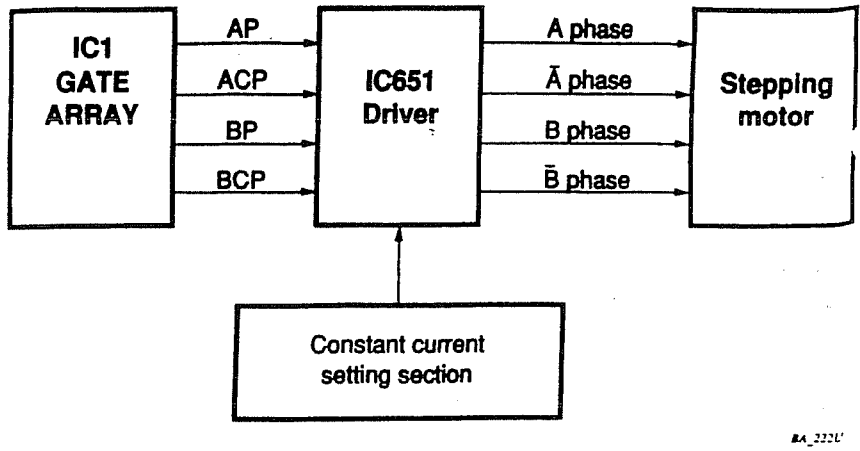


Figure 4-31-2

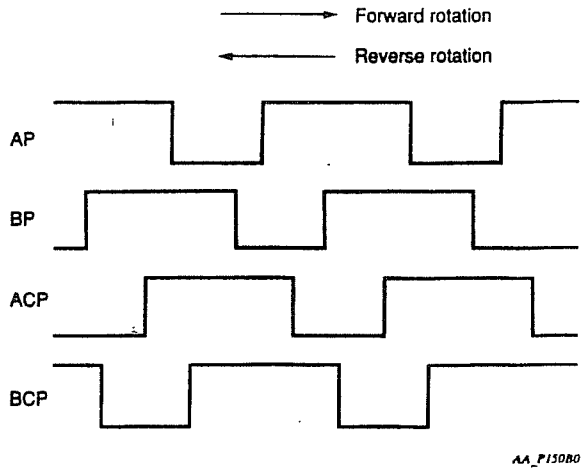


Figure 4-32-1

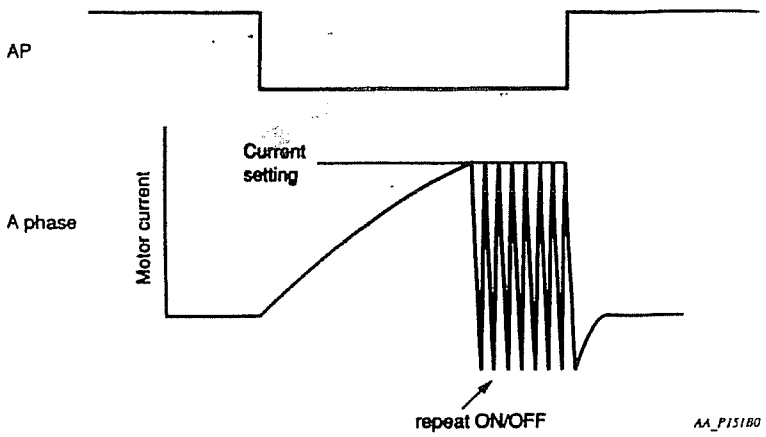


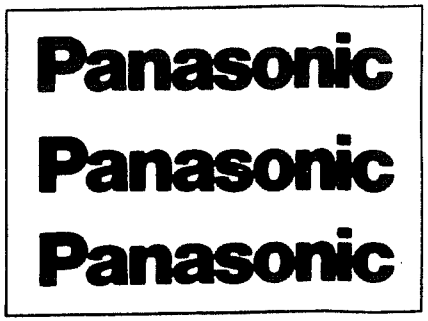
Figure 4-32-2

Section V
Troubleshooting

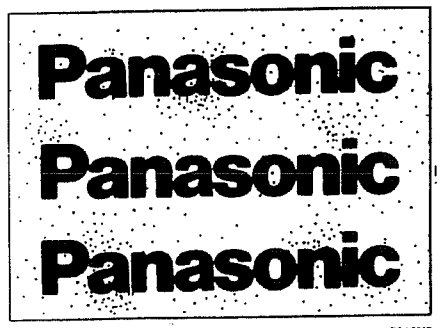
5.1 Problem flowchart

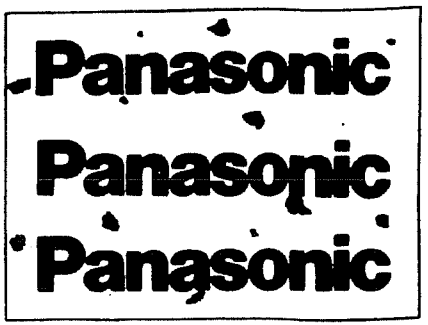
1. **Image information**
   - **Normal copy sample**
     Use this example as a good image reference.

Paper feed direction



PROBLEM: IRREGULAR DIRT





Is the platen glass dirty? Yes → Clean the platen glass.
↓ No

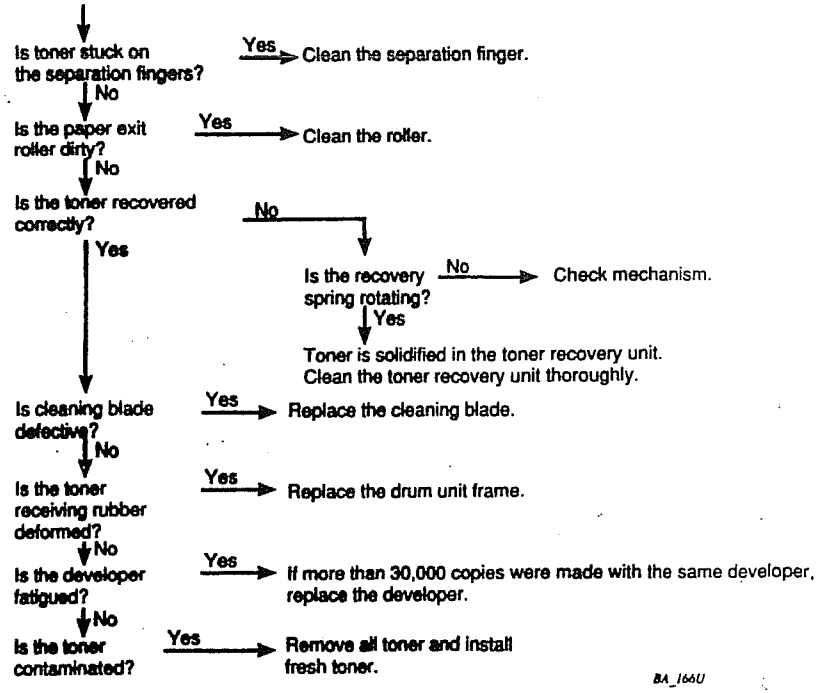
Is the paper feed roller or timing roller dirty? Yes → Clean the roller.
↓ No

Is the fuser guide plate dirty? Yes → Clean the fuser guide plate.
↓ No

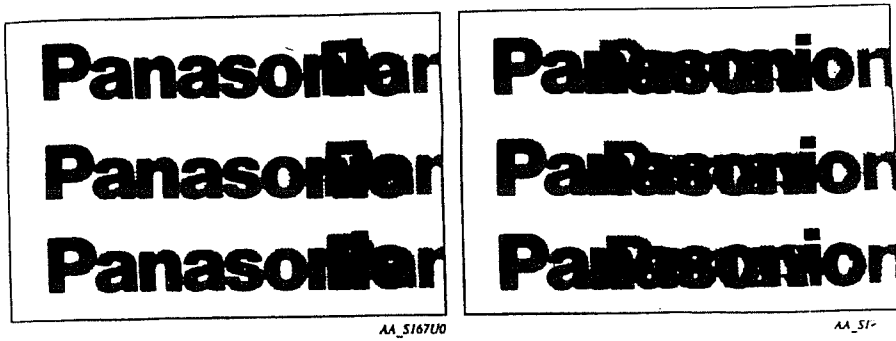
Is the heat or pressure roller dirty? Yes → Clean the heat or pressure roller. (Teflon roller only and rubber only if causing a problem, cleaning roller)
↓ No

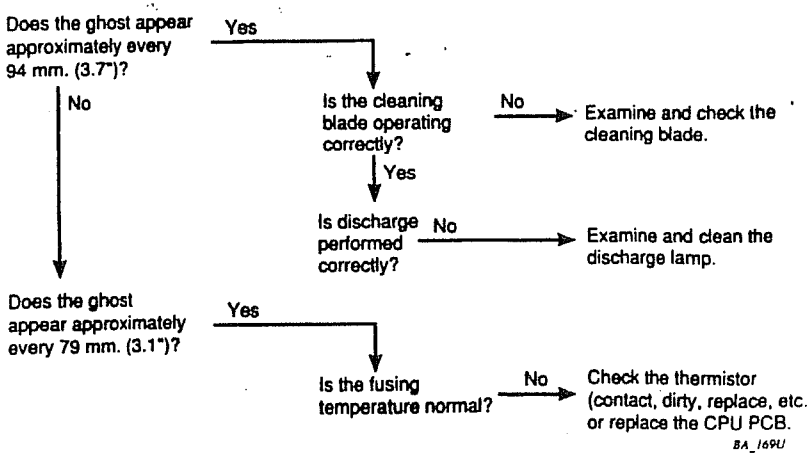
(Continued on next page.)

AA_I65U



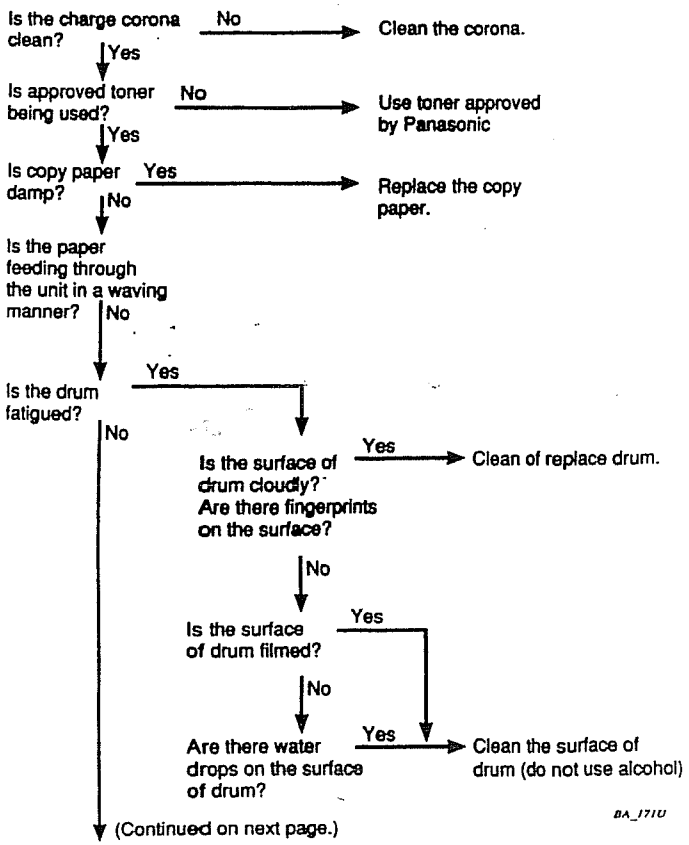
PROBLEM: GHOST-REPEATED IMAGE



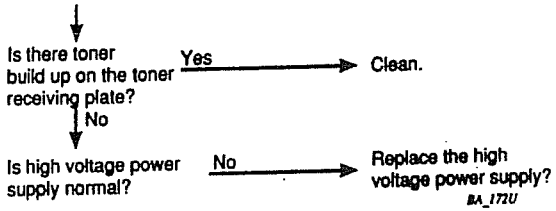

Does the ghost appear approximately every 94 mm. (3.7")?
Yes
Is the cleaning blade operating correctly?
No
Examine and check the cleaning blade.
Yes
Is discharge performed correctly?
No
Examine and clean the discharge lamp.
No
Does the ghost appear approximately every 79 mm. (3.1")?
Yes
Is the fusing temperature normal?
No
Check the thermistor (contact, dirty, replace, etc.), or replace the CPU PCB.
BA_169U

PROBLEM: VOID IN SOLID AREA AND TRAIL EDGE

AA_S170U0

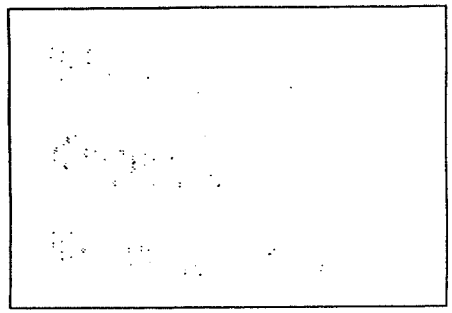


BA_171U

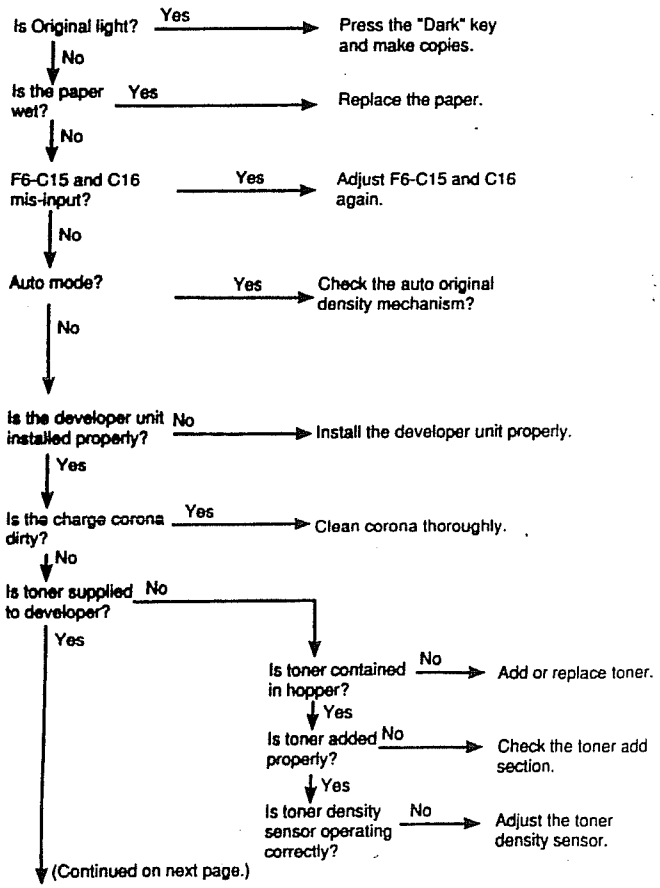


BA_172U

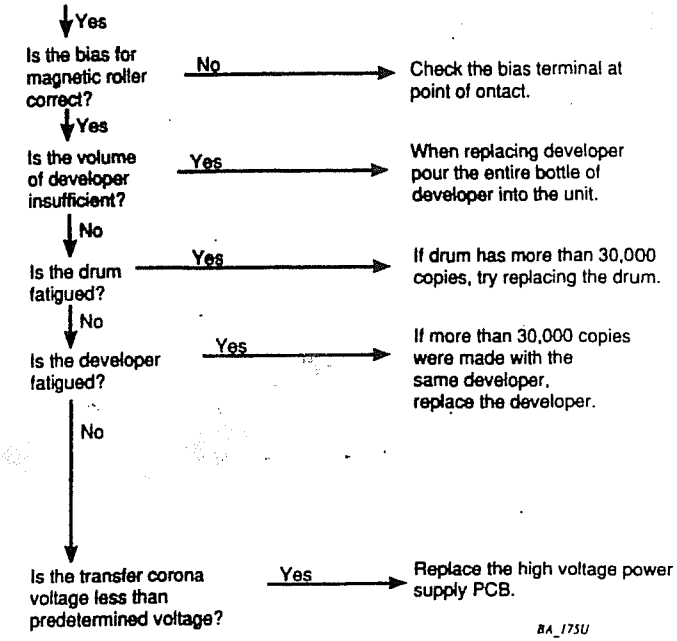
PROBLEM: LIGHT IMAGE



AA_5173U0

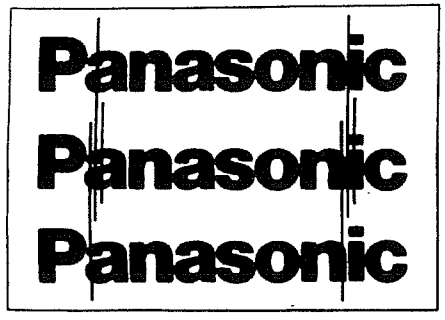


BA_174U

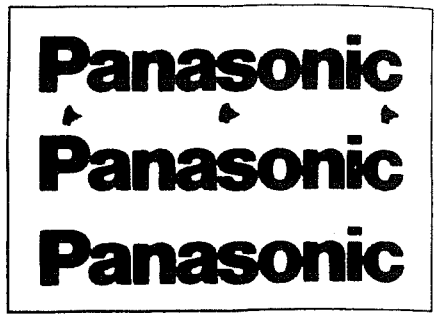

Yes
Is the bias for magnetic roller correct?
No
Check the bias terminal at point of ontact.
Yes
Is the volume of developer insufficient?
Yes
When replacing developer pour the entire bottle of developer into the unit.
No
Is the drum fatigued?
Yes
If drum has more than 30,000 copies, try replacing the drum.
No
Is the developer fatigued?
Yes
If more than 30,000 copies were made with the same developer, replace the developer.
No
Is the transfer corona voltage less than predetermined voltage?
Yes
Replace the high voltage power supply PCB.

BA_175U

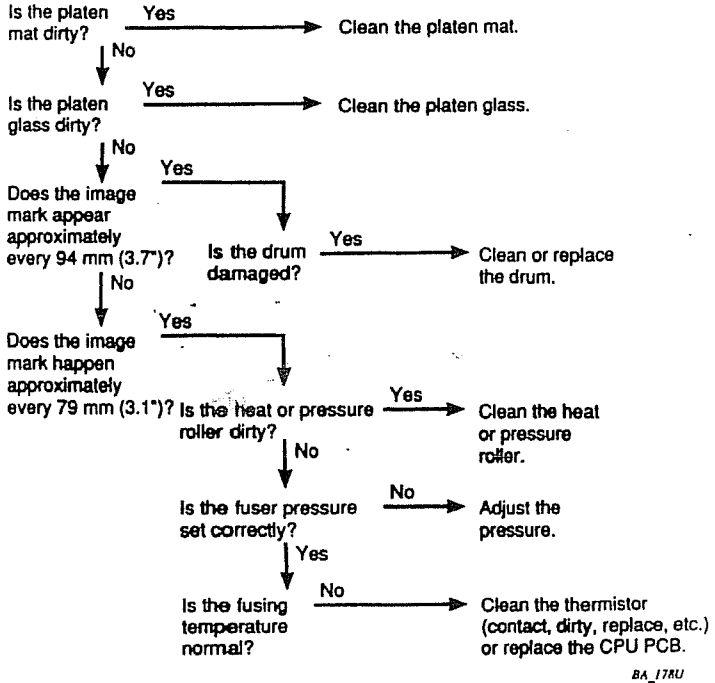
PROBLEM: MARKING ON COPY AT REGULAR INTERVALS



AA_5176U0

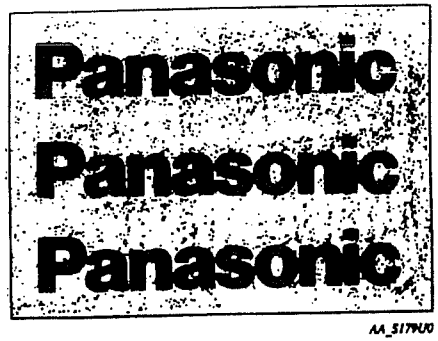


AA_5177U0

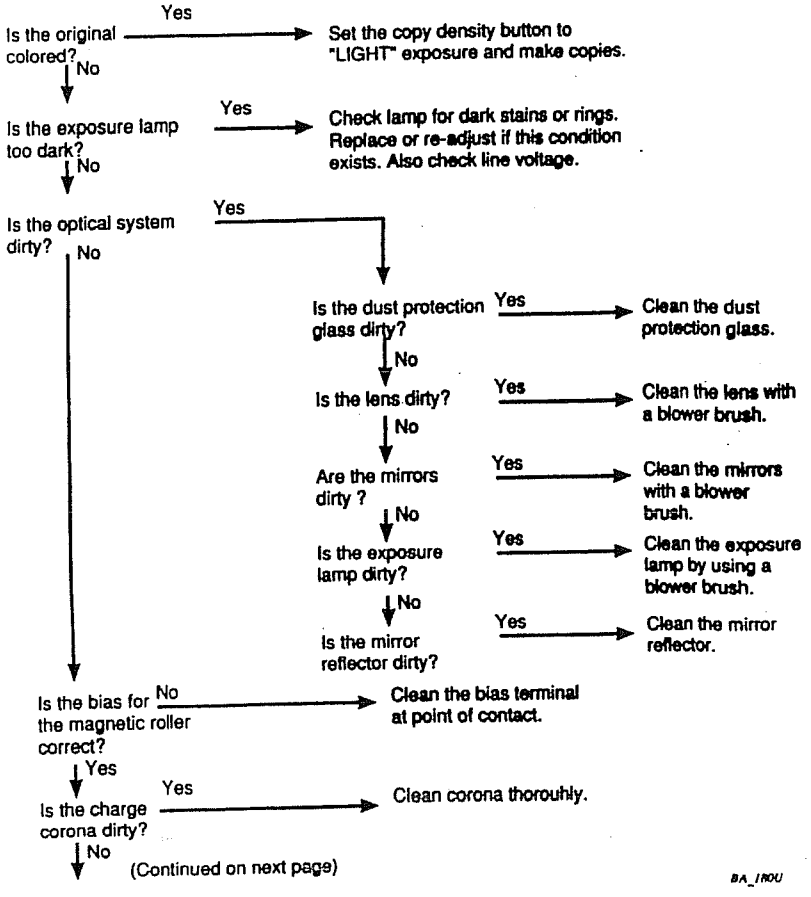


BA_178U

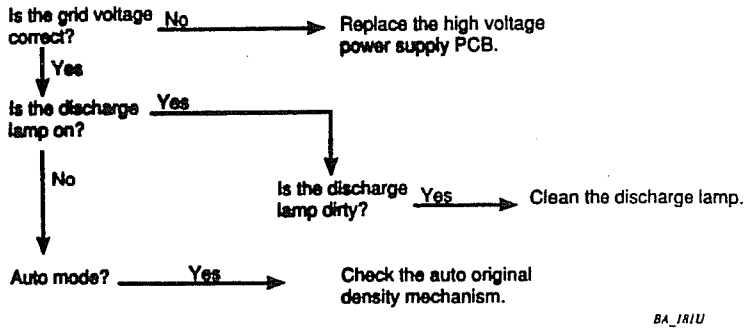
PROBLEM: BACKGROUND



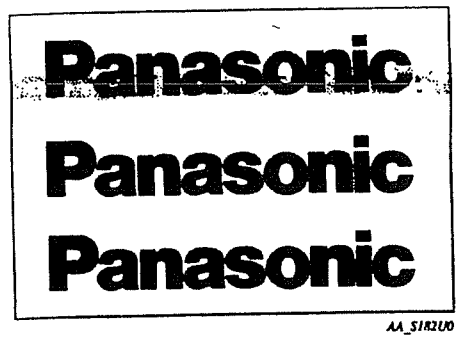
AA_5179U0

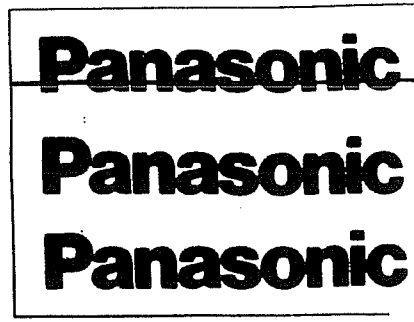


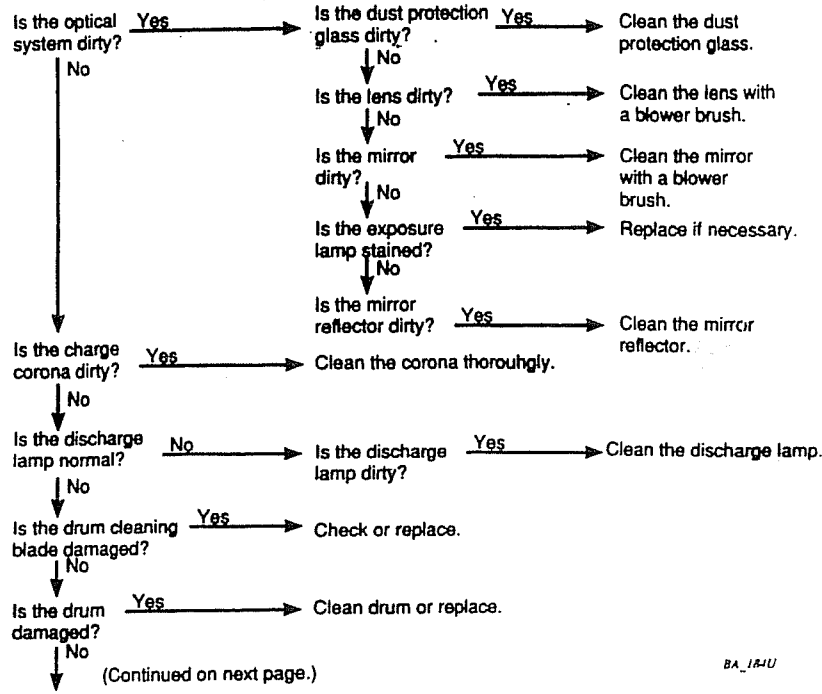
BA_180U

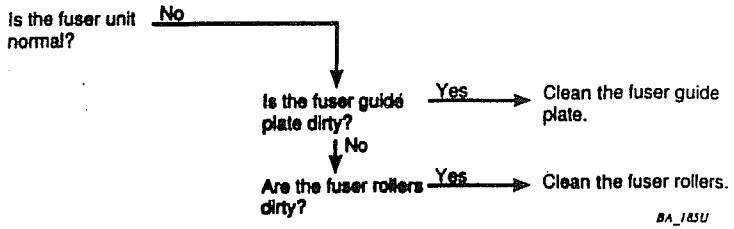


PROBLEM: DARK LINES IN DIRECTION OF PAPER FEED

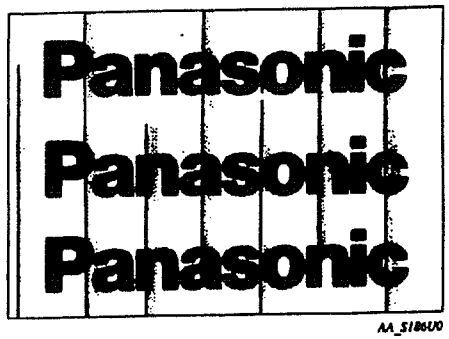


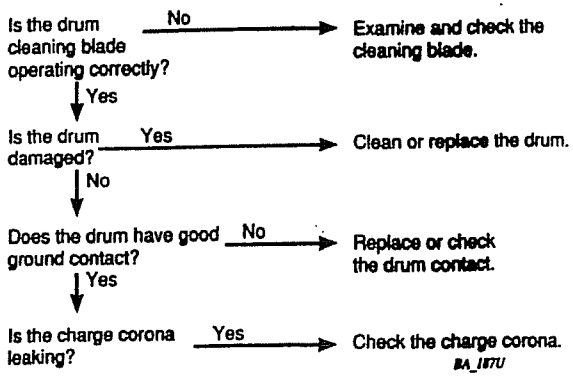




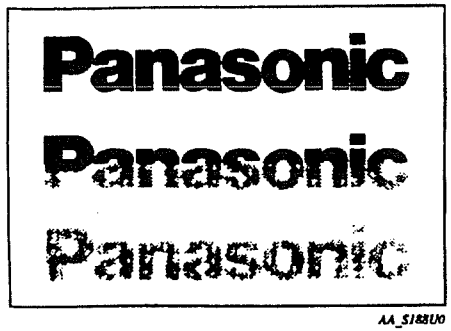


PROBLEM: DARK LINES IN OPPOSITE DIRECTION OF PAPER FEED

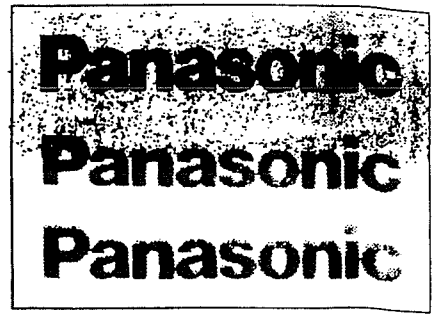




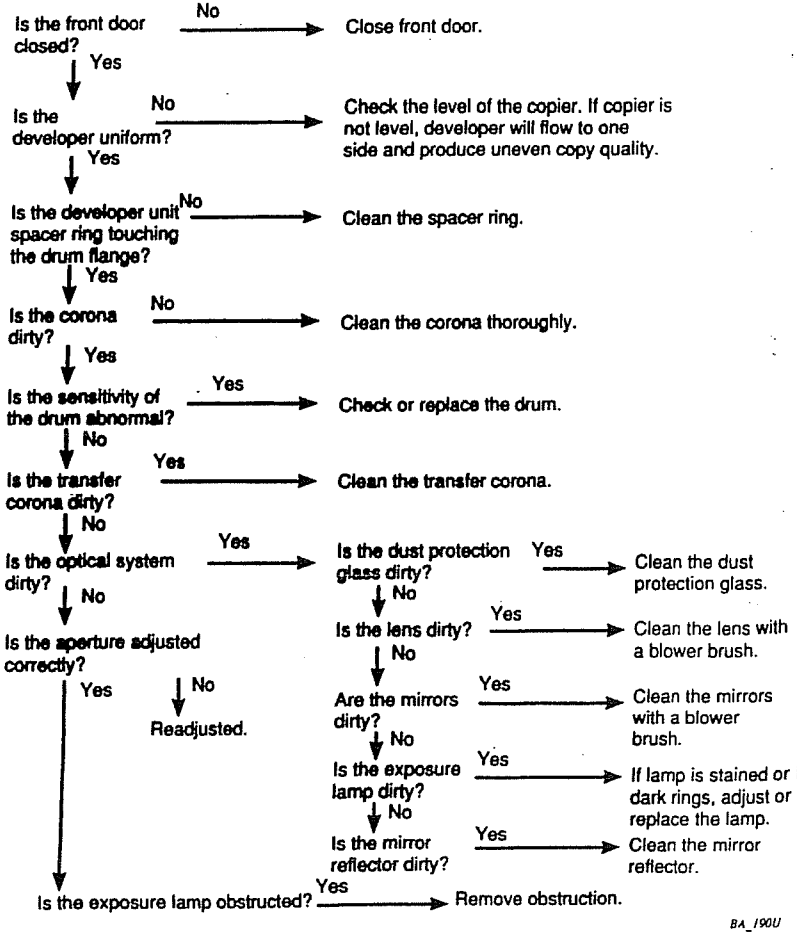
PROBLEM: VARIATION IN COPY DENSITY



AA_5188U0

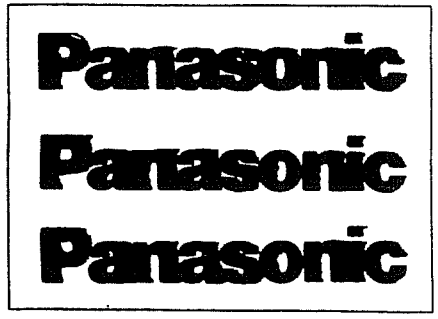


AA_5189U0

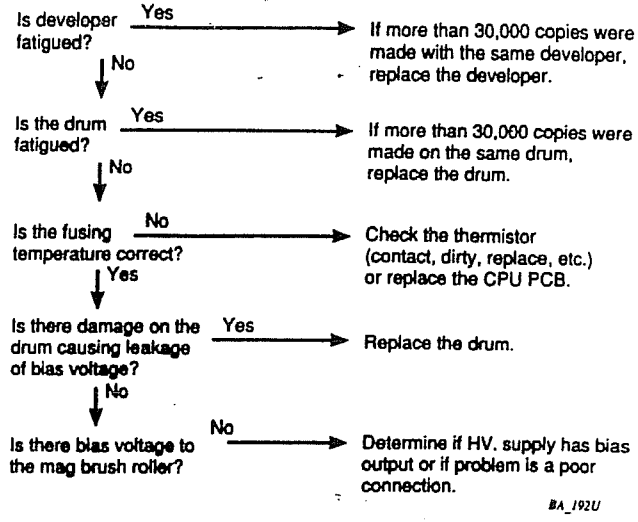


BA_190U

PROBLEM: TAILING OF IMAGE

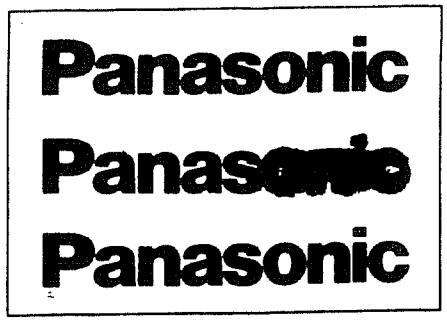


AA_5191U0

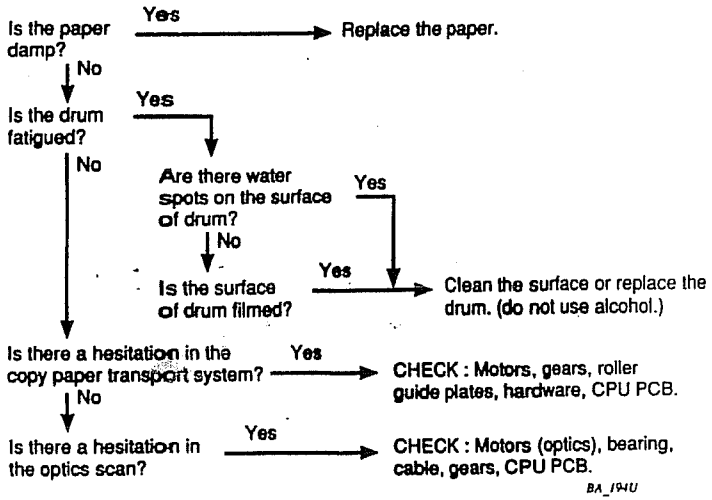

Is developer fatigued?
Yes
If more than 30,000 copies were made with the same developer, replace the developer.
No
Is the drum fatigued?
Yes
If more than 30,000 copies were made on the same drum, replace the drum.
No
Is the fusing temperature correct?
No
Check the thermistor (contact, dirty, replace, etc.) or replace the CPU PCB.
Yes
Is there damage on the drum causing leakage of bias voltage?
Yes
Replace the drum.
No
Is there bias voltage to the mag brush roller?
No
Determine if HV. supply has bias output or if problem is a poor connection.

BA_192U

PROBLEM: BLURRED IMAGE

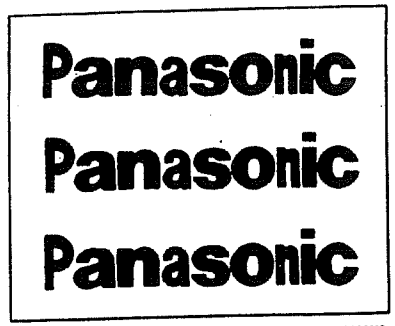


AA_5193U0

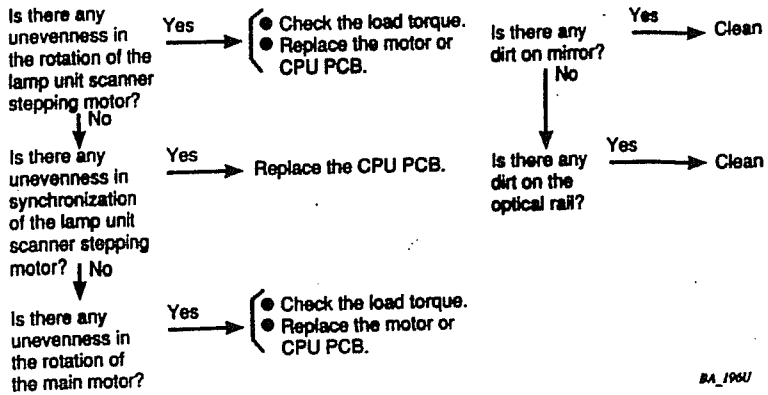

Is the paper damp?
Yes
Replace the paper.
No
Is the drum fatigued?
Yes
Are there water spots on the surface of drum?
Yes
No
Is the surface of drum filmed?
Yes
Clean the surface or replace the drum. (do not use alcohol.)
No
Is there a hesitation in the copy paper transport system?
Yes
CHECK : Motors, gears, roller guide plates, hardware, CPU PCB.
No
Is there a hesitation in the optics scan?
Yes
CHECK : Motors (optics), bearing, cable, gears, CPU PCB.

BA_194U

PROBLEM: ENLARGEMENT OR SHRINKAGE OF IMAGE (INCLUDING A DISTORTED IMAGE)

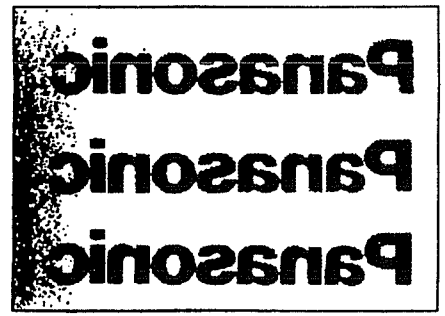


AA_5195U0

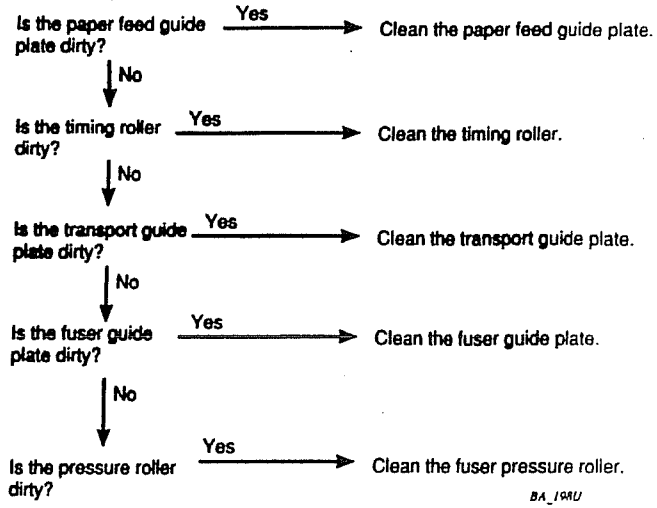

Is there any unevenness in the rotation of the lamp unit scanner stepping motor?
Yes
● Check the load torque.
● Replace the motor or CPU PCB.
Is there any dirt on mirror?
Yes
Clean
No
Is there any unevenness in synchronization of the lamp unit scanner stepping motor?
Yes
Replace the CPU PCB.
Is there any dirt on the optical rail?
Yes
Clean
No
Is there any unevenness in the rotation of the main motor?
Yes
● Check the load torque.
● Replace the motor or CPU PCB.

BA_196U

PROBLEM: MARKING ON BACK OF COPY

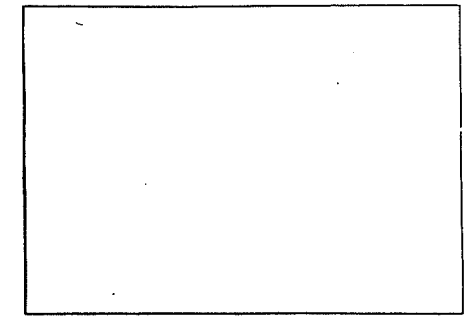


AA_S197U0

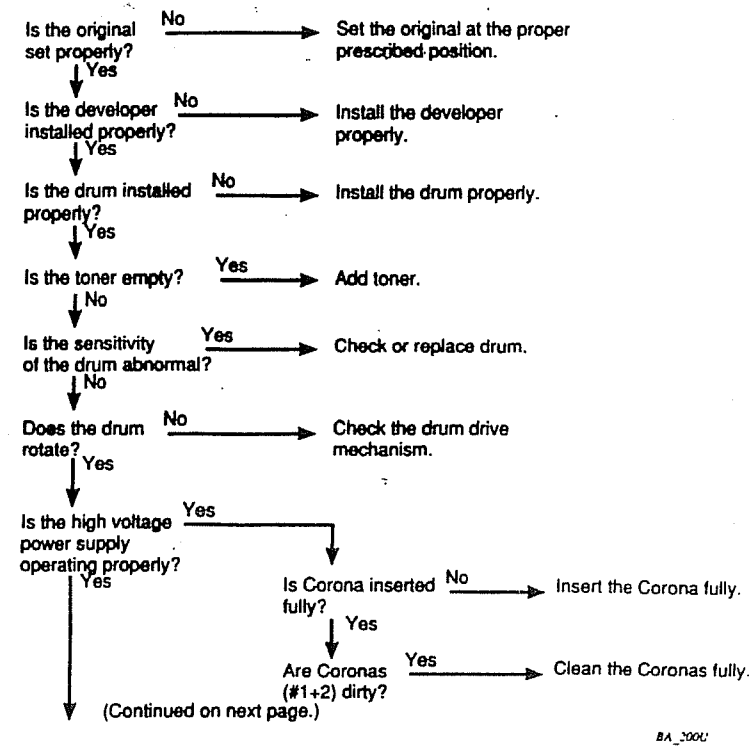


BA_I98U

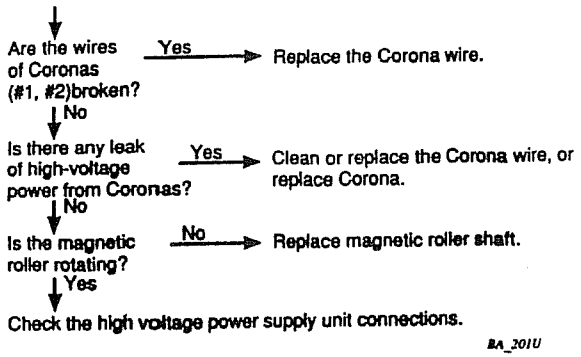
PROBLEM: WHITE COPY, NO IMAGE



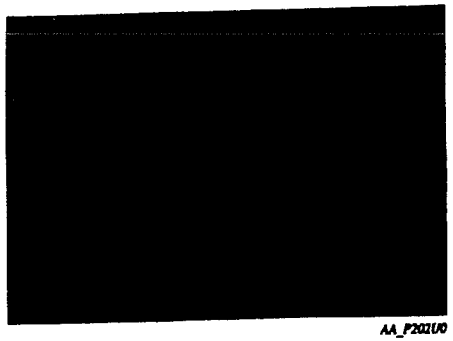
AA_P199U0

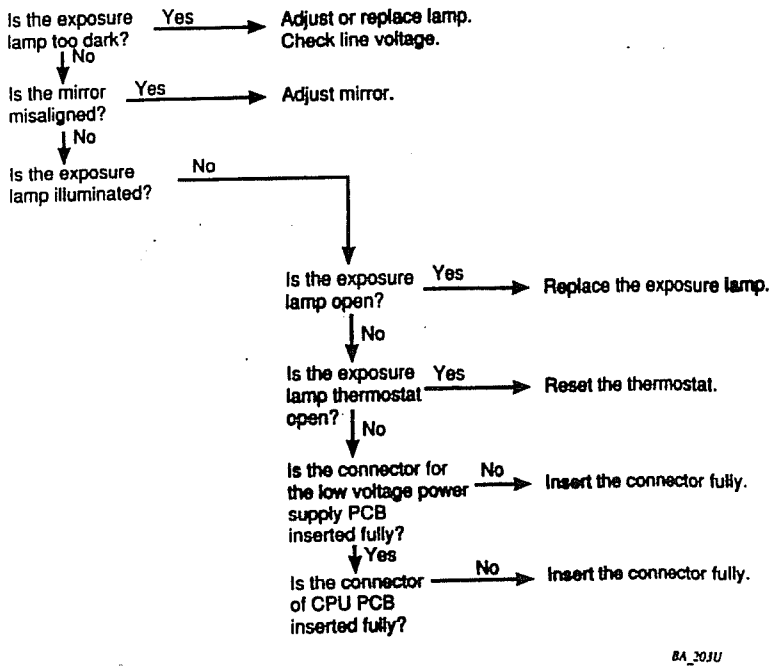


BA_200U

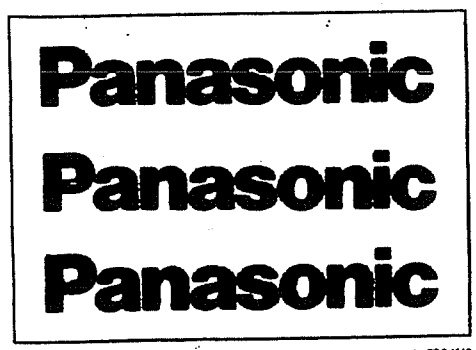


PROBLEM: SOLID BLACK COPY

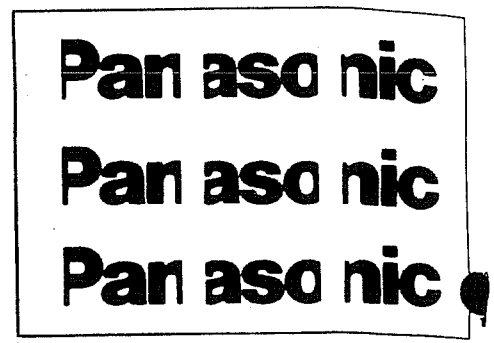




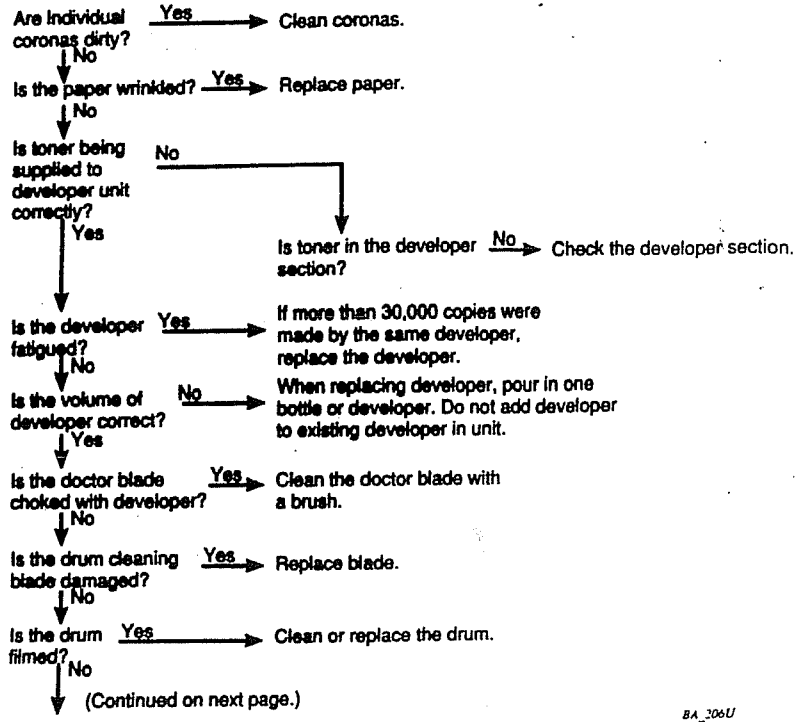
PROBLEM: WHITE LINES IN SOLID AREA



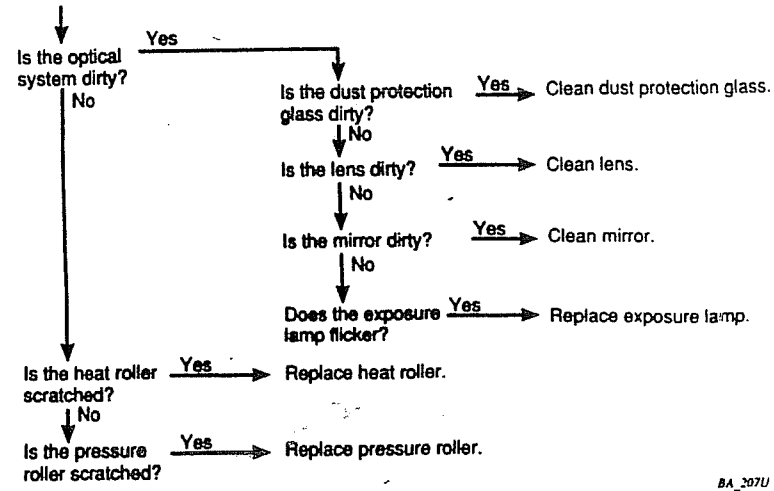
AA_5204U0



AA_5205U0

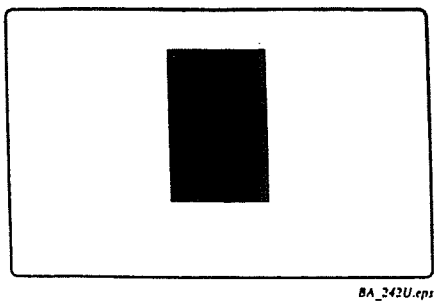


BA_206U

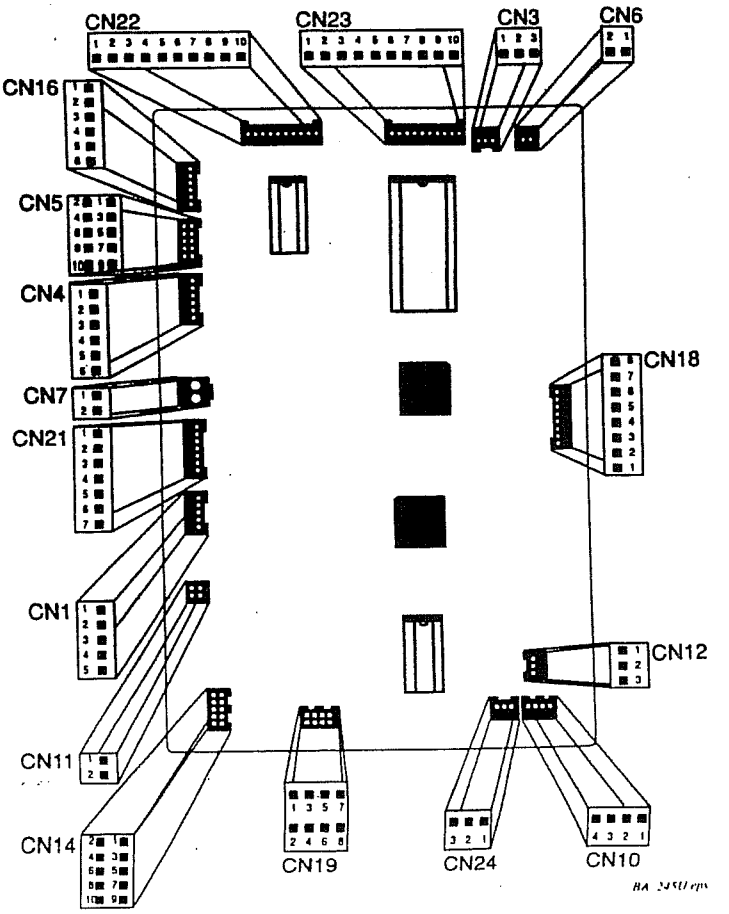


BA_207U

5.4 Troubleshooting guide CPU PCB



Rear view



(CN1)

Pin No.	Signal Name	Destination	Status	Function
1	VO	Low voltage power supply PCB CN405-5	10V / 0V	+ 10VDC power supply
2	AGND	Low voltage power supply PCB CN405-4	0V	Ground
3	VL	Low voltage power supply PCB CN405-3	5V / 0V AA_P214BO	+ 5VDC power supply
4	SGND	Low voltage power supply PCB CN405-2	0V	Signal ground
5	VCNT	Low voltage power supply PCB CN405-1	0.7V OFF ON 0.2V BA_227U	+ 24VDC ON/OFF signal

(CN3)

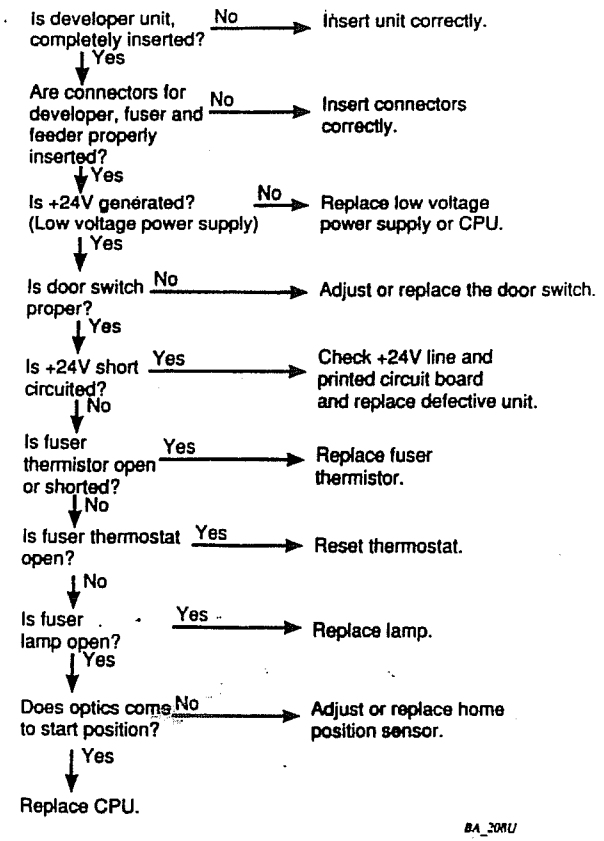
Pin No.	Signal Name	Destination	Status	Function
1	SGND	Blacking prevention film home position sensor CNSHPC-3, CNSHP-3	0V	Signal ground
2	SHPSN	Blacking prevention film home position sensor CNSHPC-2, CNSHP-2	5V ON 0V BA_228U	Shutter home position sensor ON/OFF signal
3	VL	Blacking prevention film home position sensor CNSHPC-1, CNSHP-1	5V AA	+ 5VDC power supply

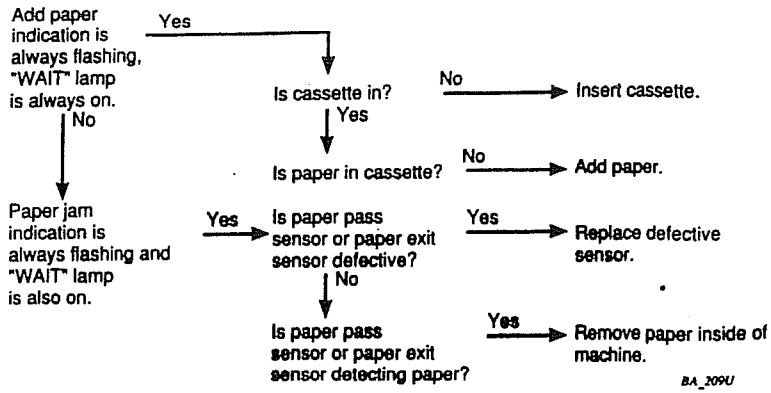
(CN4)

Pin No.	Signal Name	Destination	Status	Function
1	ACPB	Toner supply/ Blacking prevention filmmotor CNBT-6	Pulse 60V peak AA_P23RBO	Toner supply/Shutter motor drive signal $\overline{A}$
2	VP	Toner supply/Blacking prevention film motor CNBT-5	24V 0V AA_P231BO	+24VDC power supply
3	APB	Toner supply/Blacking prevention film motor CNBT-4	Pulse 60V peak AA_P23RBO	Toner supply/Shutter motor drive signal A
4	BPB	Toner supply/Blacking prevention film motor CNBT-3		Toner supply/Shutter motor drive signal B
5	VP	Toner supply/Blacking prevention film motor CNBT-2	24V 0V AA_P231BO	+24VDC power supply
6	BCPB	Toner supply/Blacking prevention film motor CNBT-1	Pulse 60V peak AA_P23RBO	Toner supply/Shutter motor drive signal $\overline{B}$

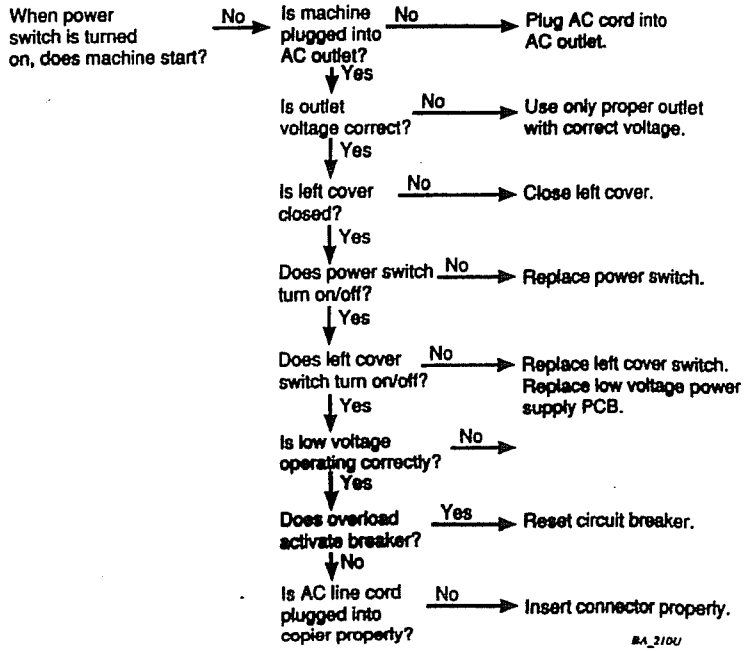
2. Other information

PROBLEM: "WAIT" LAMP ON NO COPY FUNCTION

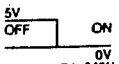
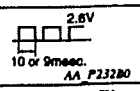
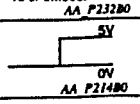
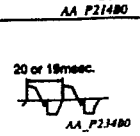




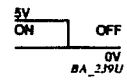
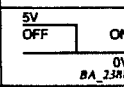
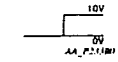
PROBLEM: MACHINE DOES NOT TURN ON



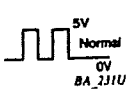
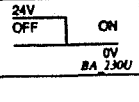
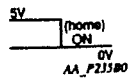
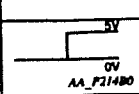
(CN21)

Pin No.	Signal Name	Destination	Status	Function
1	HTTR	Low voltage power supply PCB CN407-7		Fuser lamp ON/OFF signal
2	LPTR	Low voltage power supply PCB CN407-6		Exposure lamp ON/OFF signal
3	SGND	Low voltage power supply PCB CN407-5	0V	Signal ground
4	ZCRS	Low voltage power supply PCB CN407-4		Zero cross signal
5	VL	Low voltage power supply PCB CN407-3		+5VDC power supply
6	LFB2	Low voltage power supply PCB CN407-2		Voltage feed back 2 for exposure lamp
	LFB1	Low voltage power supply PCB CN407-1		Voltage feed back 1 for exposure lamp

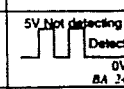
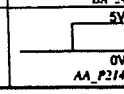
(CN22)

Pin No.	Signal Name	Destination	Status	Function
1	P50	Optics driver PCB CN651-1		Lamp unit scanner motor drive signal A
2	P52	Optics driver PCB CN651-2		Lamp unit scanner motor drive signal B
3	P51	Optics driver PCB CN651-3		Lamp unit scanner motor drive signal A
4	P53	Optics driver PCB CN651-4		Lamp unit scanner motor drive signal B
5	LMPD	Optics driver PCB CN651-5	0V: Normal	Lamp unit scanner motor power down control signal
6	SNSL	Optics driver PCB CN651-6		Full-speed unit solenoid control signal
7	H56SL	Optics driver PCB CN651-7		Half-speed unit solenoid control signal
8	AESL	Optics driver PCB CN651-8		Auto original density solenoid ON/OFF signal
9	AESN	Optics driver PCB CN651-9	Analogue level 0 - 4V	Auto original density sensor output signal
10	VO	Optics driver PCB CN651-10		+10VDC power supply

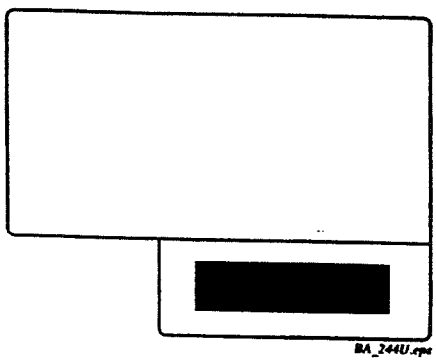
(CN23)

Pin No.	Signal Name	Destination	Status	Function
1	AGND	Optics driver PCB CN652-1	0V	Ground
2	LPFLCK 1	Optics driver PCB CN652-2		Lamp unit scanner motor lock 1 signal
3	LPFLCK 2	Optics driver PCB CN652-3		Lamp unit scanner motor lock 2 signal
4	LPFCNT	Optics driver PCB CN652-4		Optics cooling fan motor ON/OFF signal
5	56HPSN	Optics driver PCB CN652-5		No.5/6 mirror unit home position sensor ON/OFF signal
6	HPSN	Optics driver PCB CN652-6		Full-speed unit home position sensor ON/OFF signal
7	HSHPSNS	Optics driver PCB CN652-7		Half-speed unit home position sensor ON/OFF signal
8	VL	Optics driver PCB CN652-8		+5VDC power supply
9	SGND	Optics driver PCB CN652-9	0V	Signal ground
10	SGND	Optics driver PCB CN652-10	0V	Signal ground

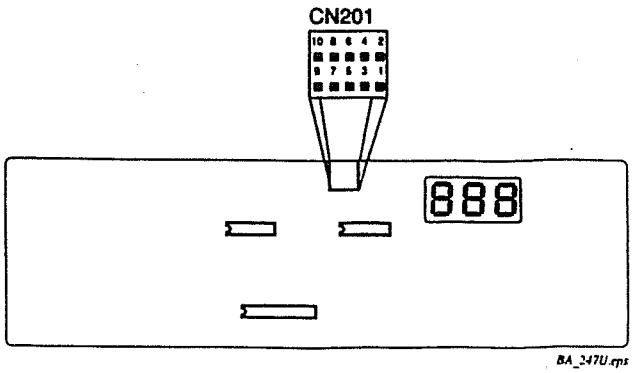
(CN24)

Pin No.	Signal Name	Destination	Status	Function
1	SGND	Sheet bypass paper pass sensor CNHFPP-1	0V	Signal ground
2	HFPPSN	Sheet bypass paper pass sensor CNHFPP-2		Sheet bypass paper pass sensor signal
3	VL	Sheet bypass paper pass sensor CNHFPP-3		+5VDC power supply

Control panel PCB



Top view



(CN201)

Pin No.	Signal Name	Destination	Status	Function
1	CPDATA	CPU PCB CN5-1		Control panel transmission data signal
2	CPKEY	CPU PCB CN5-2	5V 0V AA_P21688	Control panel key data signal
3	LCLK	CPU PCB CN5-3		Control panel LED data transmission clock signal
4	CPLD	CPU PCB CN5-4	5V 0V BA_229U	Control panel transmission data load signal
5	CPLATCH	CPU PCB CN5-5	Pulse 5V 0V AA_P22488	Control panel transmission data latch signal
6	TED	CPU PCB CN5-6	—	—
7	TEDP	CPU PCB CN5-7	—	—
8	KCLK	CPU PCB CN5-8	5V 0V AA_P21680	Control panel key data transmission clock signal
9	SGND	CPU PCB CN5-9	0V	Signal ground
10	VL	CPU PCB CN5-10	5V	+5VDC power supply

(CN5)

Pin No.	Signal Name	Destination	Status	Function
1	CPDATA	Control panel PCB CN201-1	5V 0V AA_P21680	Control panel transmission data signal
2	CPKEY	Control panel PCB CN201-2		Control panel key data signal
3	LCLK	Control panel PCB CN201-3		Control panel LED data transmission clock signal
4	CPLD	Control panel PCB CN201-4	5V 0V BA_229U	Control panel transmission data load signal
5	CPLATCH	Control panel PCB CN201-5	Pulse 5V 0V AA_P22480	Control panel transmission data latch signal
6	TED	Control panel PCB CN201-6	—	—
	TEDP	Control panel PCB CN201-7	—	—
8	KCLK	Control panel PCB CN201-8	5V 0V AA_P21680	Control panel key data transmission clock signal
9	SGND	Control panel PCB CN201-9	0V	Signal ground
10	VL	Control panel PCB CN201-10	5V 0V AA_P21480	+5VDC power supply

(CN6)

Pin No.	Signal Name	Destination	Status	Function
1	VP	Discharge lamp	24V 0V AA_P23180	+24VDC power supply
2	ELP		24V ON OFF 0V AA_P23180	Discharge lamp ON/OFF signal

(CN7)

Pin No.	Signal Name	Destination	Status	Function
1	VP	Low voltage power supply PCB CN406-3	24V 0V AA_P23180	+24VDC power supply
2	PGND	Low voltage power supply PCB CN406-1	0V	Power ground

(CN10)

Pin No.	Signal Name	Destination	Status	Function
1	SGND	Paper exit sensor CNPFOC-1, CNPFO-3	0V	Signal ground
2	PFOSN	Paper exit sensor CNPFOC-2, CNPFO-2	Not detecting 5V 0V Detecting 20msec. AA_P22980	Paper exit sensor ON/OFF signal
3	VL	Paper exit sensor CNPFOC-3, CNPFO-1	5V 0V AA_P21480	+5VDC power supply
4	—	—	—	—

(CN11)

Pin No.	Signal Name	Destination	Status	Function
1	VP	Total counter CNCT-1	24V 0V AA_P23180	+24VDC power supply
2	CT	Total counter CNCT-2	24V OFF ON 0V BA_230U	Total counter ON/OFF signal

(CN12)

Pin No.	Signal Name	Destination	Status	Function
1	SGND	Timing roller sensor CNRR-3	0V	Ground
2	RRSN	Timing roller sensor CNRR-2	Not detecting 5V 0V Detecting 20msec. AA_P22980	Timing roller sensor ON/OFF signal
3	VL	Timing roller sensor CNRR-1	5V 0V AA_P21480	+5VDC power supply

(CN14)

Pin No.	Signal Name	Destination	Status	Function
1	MMLCK	Main motor CNMM-5	5V Normal 0V BA_231U	Main motor lock signal
2	PGND	Main motor CNMM-4	0V	Power ground
3	MMCNT	Main motor CNMM-3	5V AUS EIN 0V BA_232G	Main motor ON/OFF drive signal
4	PGND	Main motor CNMM-2	0V	Power ground
5	VP	Main motor CNMM-1	24V 0V AA_P231B0	+24VDC power supply
6	PGND	Fuser cooling fan motor CNEX-3	0V	Power ground
7	EXFLCK	Fuser cooling fan motor CNEX-2	5V Normal 0V BA_231U	Fuser cooling fan motor lock signal
8	EXFCNT	Fuser cooling fan motor CNEX-1	24V ON OFF 0V AA_P21B0	Fuser cooling fan motor ON/OFF drive signal
9	PFCR	Paper feed roller clutch CNPF-1	24V ON OFF 0V AA_P21B0	Paper feed roller clutch ON/OFF drive signal
10	VP	Paper feed roller clutch CNPF-2	24V 0V AA_P231B0	+24VDC power supply

(CN16)

Pin No.	Signal Name	Destination	Status	Function
1	SGND	Toner density sensor CNTD-1, CNTDC-1	0V	Signal ground
2	TDC	Toner density sensor CNTD-2, CNTDC-2	Analogue level 0.5 - 5.0V	Toner density sensor signal
3	VP	Toner density sensor CNTD-3, CNTDC-3	24V 0V AA_P231B0	+24VDC power supply
4	TDCNT	Toner density sensor CNTD-4, CNTDC-4	Analogue level	Toner density sensor gain control signal
5	DVE	Developer unit connector CNTD-5, 6	5V Installation 0V BA_233U	Developer unit detecting signal
6	SGND		0V	Signal ground

(CN18)

Pin No.	Signal Name	Destination	Status	Function
1	VP	High voltage power supply PCB CN701-1	24V 0V AA_P231B0	+24VDC power supply
2	PGND	High voltage power supply PCB CN701-2	0V	Power ground
3	HVCNT	High voltage power supply PCB CN701-3	12V ON OFF 5V BA_234U	High voltage power supply ON/OFF control signal (for Charge/Transfer corona)
4	HVLKC	High voltage power supply PCB CN701-4	Leak 0V BA_235U	Self-diagnostic input signal for high voltage leak +5V:Normal 0V:Leak
5	GRCNT	High voltage power supply PCB CN701-5	10V OFF 0V BA_236U	Grid voltage ON/OFF signal
6	GCNT	High voltage power supply PCB CN701-6	Analogue level 0.5 - 8.5V	Grid voltage control signal
7	HVBCNT	High voltage power supply PCB CN701-7	16V OFF ON 0V BA_237U	High voltage power supply ON/OFF control signal (for Developer bias/Separation corona)
8	BCNT	High voltage power supply PCB CN701-8	Analogue level 0 - 8.5V	Bias voltage control signal

(CN19)

Pin No.	Signal Name	Destination	Status	Function
1	TH1	Fuser thermistor CNTH-1	Analogue level	Fuser thermistor terminal 1
2	TH2	Fuser thermistor CNTH-2	Analogue level	Fuser thermistor terminal 2
3	HFSOL	—	—	—
4	VP	—	—	—
5	HFCR	Sheet bypass clutch CNHF-1	24V OFF ON 0V BA_230U	Sheet bypass clutch ON/OFF signal
6	VP	Sheet bypass clutch CNHF-2	24V 0V AA_P231B0	+24VDC power supply
7	RRCR	Paper feed roller clutch CNRR-1	24V OFF ON 0V BA_230U	Timing roller clutch ON/OFF signal
8	VP	Paper feed roller clutch CNRR-2	24V 0V AA_P231B0	+24VDC power supply

w voltage power supply PCB

CN402)

Pin No.	Signal Name	Destination	Status	Function
1	AC1	Lamp unit CNLP-1	120/220-240 VAC	120/220-240 VAC power supply (Live)
2	EXLP	Lamp unit CNLP-2	87/134 VACrms (lighting) 20 or 18msec. BA_241U	Exposure lamp lighting

(CN405)

Pin No.	Signal Name	Destination	Status	Function
1	VCNT	CPU PCB CN1-5	5V OFF ON 0V AA_P213B0	+24VDC ON/OFF signal
2	SGND	CPU PCB CN1-4	0V	Signal ground
3	VL	CPU PCB CN1-3	5V 0V AA_P214B0	+5VDC power supply
4	AGND	CPU PCB CN1-2	0V	Ground
5	VO	CPU PCB CN1-1	10V 0V	+10VDC power supply

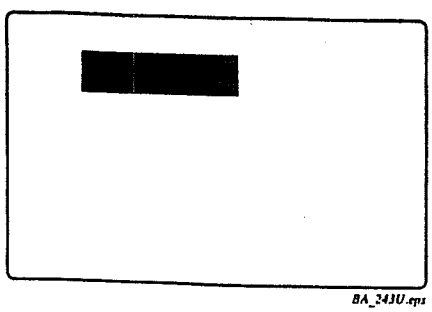
(CN406)

Pin No.	Signal Name	Destination	Status	Function
1	PGND	CPU PCB CN7-2	0V	Power ground
2	PGND	Optics driver PCB CN653-2	0V	Power ground
3	VP	CPU PCB CN7-1	24V 0V AA_P231B0	+24VDC power supply
4	VP	Optics driver PCB CN653-1	24V 0V AA_P231B0	+24VDC power supply

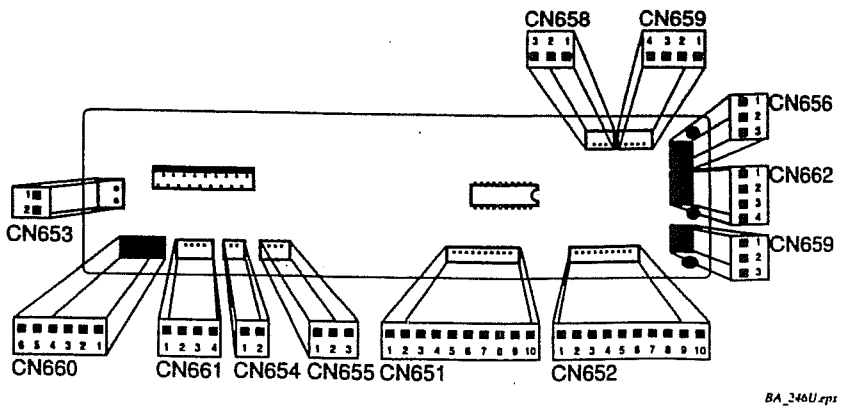
CN407)

Pin No.	Signal Name	Destination	Status	Function
1	LFB1	CPU PCB CN21-7	20 or 19msec. AA_P234B0	Voltage feed back 1 for exposure lamp
	LFB2	CPU PCB CN21-6		Voltage feed back 2 for exposure lamp
3	VL	CPU PCB CN21-5	5V 0V AA_P214B0	+5VDC power supply
4	ZCRS	CPU PCB CN21-4	2.6V 10 or 9msec. AA_P232B0	Zero cross signal
5	SGND	CPU PCB CN21-3	0V	Ground
6	LPTR	CPU PCB CN21-2	5V OFF ON 0V BA_23HU	Exposure lamp ON/OFF signal
7	HTTR	CPU PCB CN21-1		Fuser lamp ON/OFF signal

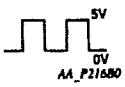
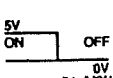
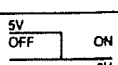
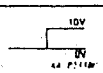
Optics driver PCB



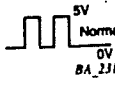
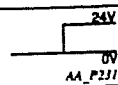
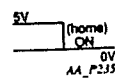
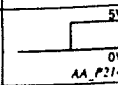
Rear view



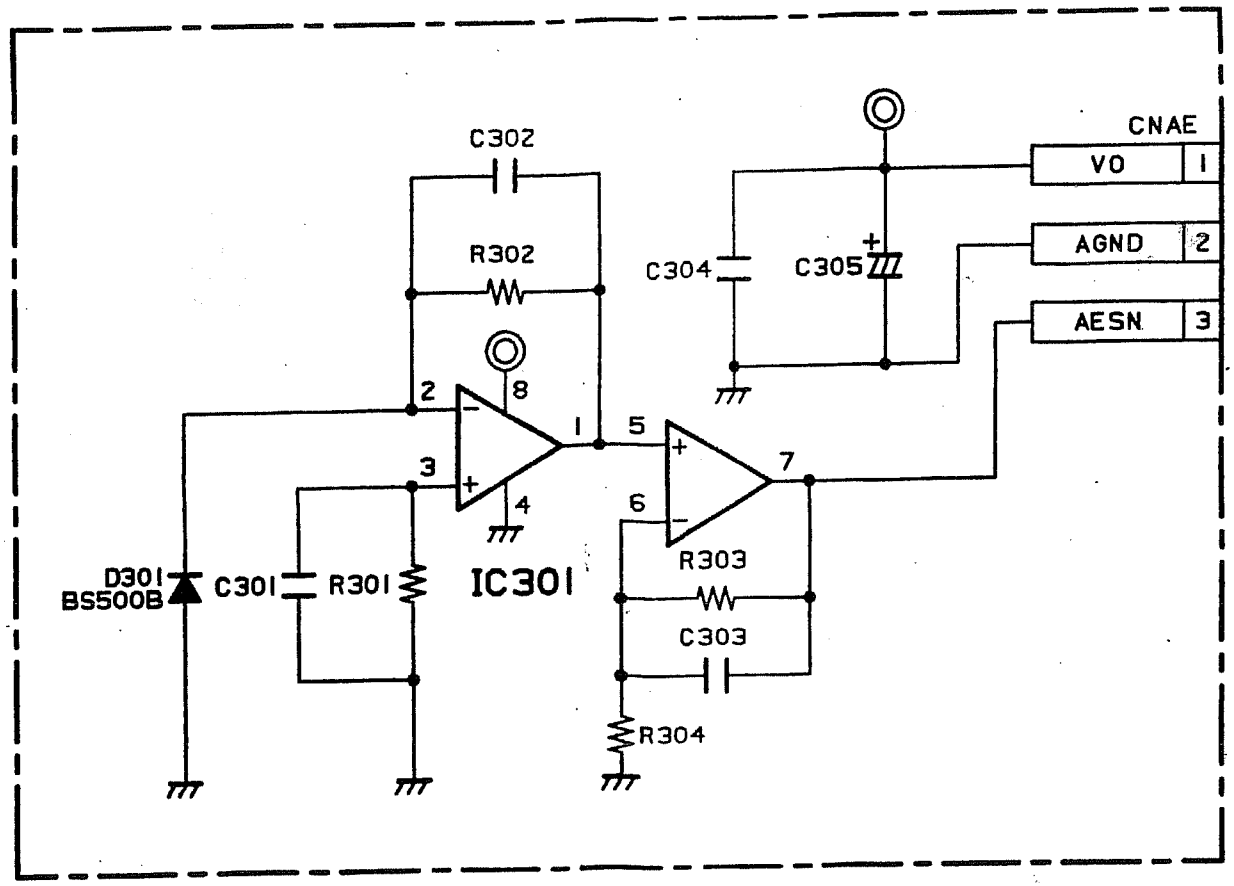
(CN651)

Pin No.	Signal Name	Destination	Status	Function
1	P50	CPU PCB CN22-1		Lamp unit scanner motor drive signal A
2	P52	CPU PCB CN22-2		Lamp unit scanner motor drive signal B
3	P51	CPU PCB CN22-3		Lamp unit scanner motor drive signal A
4	P53	CPU PCB CN22-4		Lamp unit scanner motor drive signal B
5	LMPD	CPU PCB CN22-5	0V: Normal	Lamp unit scanner motor power down control signal
6	SNSL	CPU PCB CN22-6		Full-speed unit solenoid control signal
7	H56SL	CPU PCB CN22-7		Half-speed unit solenoid control signal
8	AESL	CPU PCB CN22-8		Auto original density solenoid ON/OFF signal
9	AESN	CPU PCB CN22-9	Analogue level 0 - 4V	Auto original density sensor output signal
10	VO	CPU PCB CN22-10		+10VDC power supply

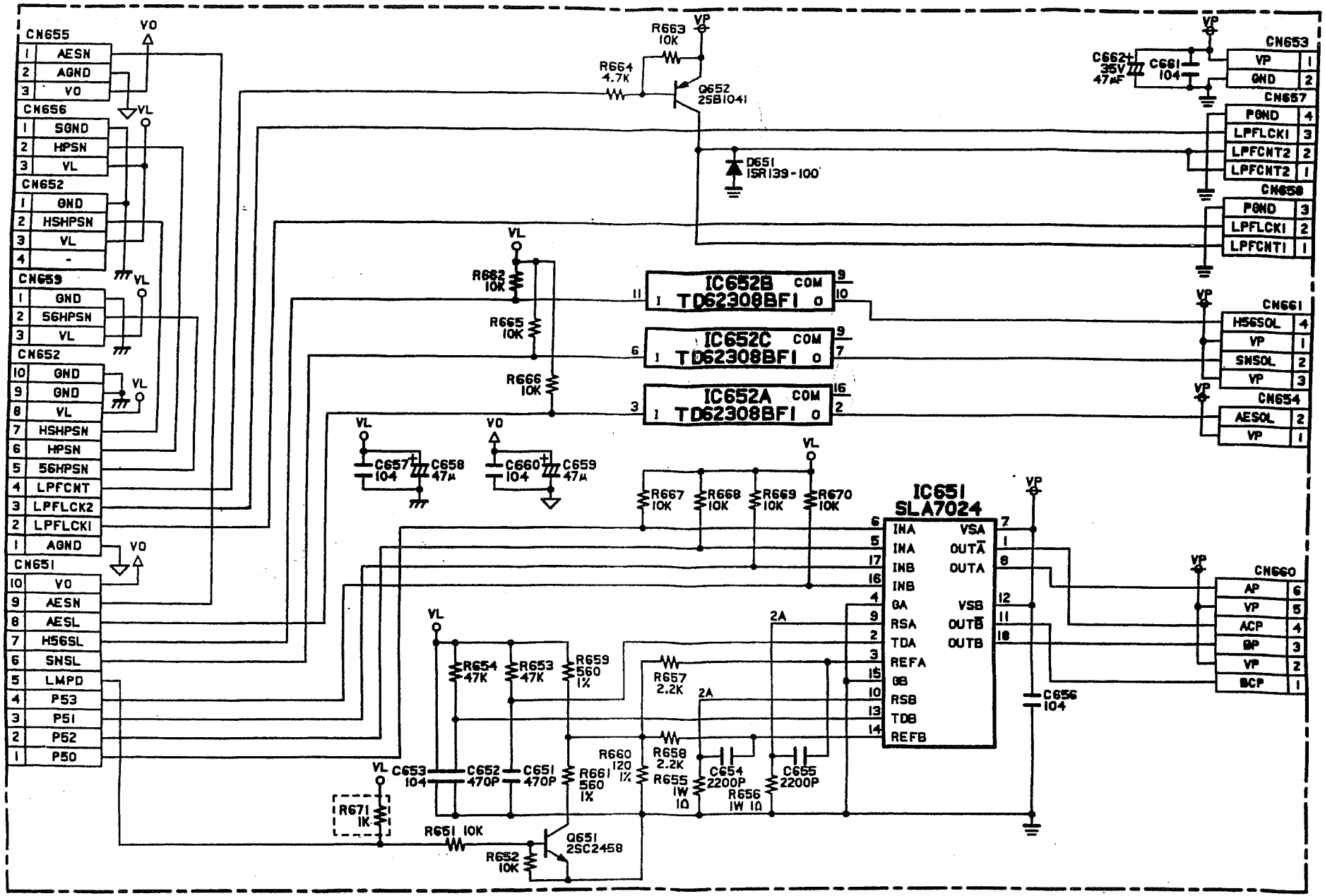
(CN652)

Pin No.	Signal Name	Destination	Status	Function
1	AGND	CPU PCB CN23-1	0V	Ground
2	LPFLCK 2	CPU PCB CN23-2		Lamp unit scanner motor lock 2 signal
3	LPFLCK 1	CPU PCB CN23-3		Lamp unit scanner motor lock 1 signal
4	LPFCNT	CPU PCB CN23-4		Optics cooling fan motor ON/OFF signal
5	56HPSN	CPU PCB CN23-5		No.5/6 mirror unit home position sensor ON/OFF signal
6	HPSN	CPU PCB CN23-6		Full-speed unit home position sensor ON/OFF signal
7	HSHPSN	CPU PCB CN23-7		Half-speed unit home position sensor ON/OFF signal
8	VL	CPU PCB CN23-8		+5VDC power supply
9	SGND	CPU PCB CN23-9	0V	Signal ground
10	SGND	CPU PCB CN23-10	0V	Signal ground

6. Auto original density sensor PCB



5. Optics driver PCB



4. Maintenance chart

Item		Part number	Q'ty per unit	(× 1000) 30	60	90	120
Sheet bypass	Paper feed roller	FFPMA0518	1	○	×	○	× (×)
	DFP roller	FFPMA0520	1	×	×	×	× (×) (×)
	Pick up roller	FFPMA0521	1	×	×	×	× (×) (×)
	Torque limiter ass'y	FFPXF21D80	1	×	×	×	× (×) (×)
Paper feed unit	Paper feed roller	FFPMA05161	1	○	×	○	× (×)
	DFP roller	FFPMA0517	1	×	×	×	× (×) (×)
	Registration roller	FFPMA05136	1	○	○	○	○
	Registration roller	FFPMA0598	1	○	○	○	○
	Cleaning pad ass'y	FFPXF18D804	1	○	○	○	○
	Torque limiter ass'y (Copier and FA-DS16)	FFPXC07D80	1	×	×	×	× (×) (×)
Developer unit	Corona wire	FFPEY00641	1		×		×
	Corona No.1 ass'y	FFPXG07D801	1	○	○	○	○
	Developer	FQ-ZF15	1		×		×
	Drum	FQ-HF13	1	×	×	×	×
	Waste toner bottle	FFPQA0143	1	Replace at 5,000 copies. (for user replacement)			
	Cleaning blade	FFPHK09051	1		×		×

○: Cleaning ×: Replacement
*( ): Replacement cycle based low usage.

*: Service personnel can amend this schedule by taking into account the percentage of paper which has passed through each paper port. We feel this will ensure more effective copier maintenance and cost effectiveness for your customers.

NOTE: When cleaning the mirrors, do not move the lamp unit or half speed unit directly. Rotate the lamp unit drive shaft.

Item		Part number	Q'ty per unit	(× 1000) 30	60	90	120
Fuser unit	Finger upper	FFPLK0336	4	○	○	○	×
	Thermistor	FFPBL0013	1	○	○	○	×
	Lamp	H12V1KWN1A (for 120V ver.) H22V1KWN1A (for 220/240V ver.)	1				×
	Cleaning pad	FFPKM02785	1	Replace at 5,000 copies. (for user replacement)			
	Heat roller	FFPMA05242	1	○	×	○	×
	Pressure roller	FFPMA0523	1	○	×	○	×
	Exit Roller	FFPMA05142	1	○	○	○	○ (Ground terminal side)
Optics	Exposure lamp	E08V025WN2A (for 120V ver.) E16V025WN2A (for 220/240V ver.)	1				×
	No. 1 mirror	FFPGC0179	1				
	No. 2 mirror	FFPGC0180	1				
	No. 3 mirror	FFPGC0181	1				
	No. 4 mirror	FFPGC0174	1	○	○	○	○
	No. 5 mirror	FFPGC0182	1				
	No. 6 mirror	FFPGC0183	1				
	Lens	FFPGA0042	1				
Main body	Filter	FFPHJ00341	1		○		○
	Ozone filter	FFPHJ00351	1		×		×
	Filter	FFPGB0021	1		○		○
	Corona wire	FFPEY00641	1		×		×
	Corona No.2/3 ass'y	FFPXF10D803	1	○	○	○	×
	Cover glass	FFPGC0184	1	○	○	○	○
	Platen glass	FFPGC0154	1	○	○	○	○
	Platen rubber	FFPNN00362	1	○	○	○	○
	Belt shutter	FFPJC0260	1				×

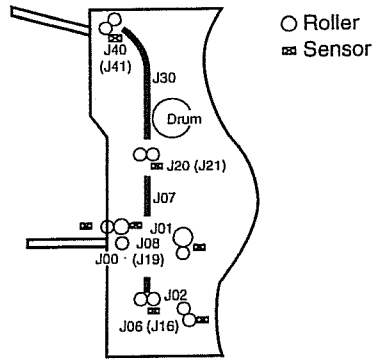
○: Cleaning ×: Replacement

5. Troubleshooting

5-1. User error

Error code	Item	Cause/ Check
o	Power saving and Condensation • To clear the "o", press any DIGIT key.	1. When copying is completed after the lapse of F5-C13-input number.
O	STAND-BY • The DIGIT display indicates "0" and the other displays are turned OFF. • To clear the STAND-BY mode, press any DIGIT key.	1. When copying is completed after the lapse of 2 minutes (F5-C03-1 input), or 4 minutes (F5-C03-2 input), "0" is indicated.
PXX	Add paper	1. This display flashes when there is no paper in tray. 2. When using ADF • Original-size paper is not installed in the copier.
U6	Paper feed door failure (Paper feed console)	1. The paper feed door is opened.
U10	ADF failure	1. The ADF is opened after placed original(s).
U13	Toner empty detection • Cancellation of U13 F5-C63-0 input: Press any DIGIT key. F5-C63-1 input: Press PAPER TRAY and 10 DIGIT keys.	1. When the toner hopper is empty. 2. Toner density sensor is defective. 3. Toner supply mechanism is malfunctioning. 4. CPU PCB is defective.
U16	Developer unit failure • If in service mode and the developer unit is not installed, the "UFX" (X = service mode number) will appear in the DIGIT display.	1. When the developer unit is not installed correctly. 2. When the developer unit connector is not inserted correctly. 3. When the developer unit connector is defective. 4. CPU PCB is defective.

5-2. Paper jam



Jam read code (F8-C06 is in use)	Condition
J00 (FP-7715)	Paper jam (Bypass) • When the timing roller sensor does not detect paper within a predetermined time after bypass paper feed starts rotating.
J01 (FP-7715)	Paper jam (Copier paper tray) • When the timing roller sensor does not detect paper within a predetermined time after paper feed starts rotating.
J02 (FP-7715)	Paper jam (Paper feed console) • When the paper feed console registration roller sensor does not detect paper within a predetermined time after paper feed starts rotating.
J06 (FP-7715)	Paper jam (Paper feed console) • When the trail edge of the paper is not detected within a predetermined time after the registration roller sensor detects the lead edge of the paper.
J16 (FP-7715)	Paper jam (Paper feed console) • The paper feed console registration roller sensor detects paper when the power switch is turned ON.
J07	Paper jam (Bypass) • When the timing roller sensor does not detect paper within a predetermined time after the sheet bypass paper pass sensor detects paper.

Jam read code (F8-C06 is in use)	Condition
J08	• When the trail edge of the paper is not detected within a predetermined time after the sheet bypass paper pass sensor detects the lead edge of the paper.
J19	• When the sheet bypass paper pass sensor detects paper when the power switch is turned ON.
J20	• When the trail edge of the paper is not detected within a predetermined time after the timing roller sensor detects the lead edge of the paper.
J21	• When the timing roller sensor detects paper when the power switch is turned ON.
J30	Paper jam (between timing roller sensor and paper exit sensor) • When paper exit sensor does not detect paper within a predetermined time after the timing roller starts rotating.
J40	• When the trail edge of the paper is not detected within a predetermined time after the paper exit sensor detects the lead edge of the paper.
J41	• The paper exit sensor detects paper when the power switch is turned ON.
J70 (FP-7715)	ADF jam (ADF) • When an original is jammed in the ADF.

5-3. Machine error

E1: Optical unit error

Code	Function/Cause
01	Full-speed unit scan operating • When the full-speed unit does not trigger the full-speed unit home position sensor within a predetermined time.
02 to 20	Not used
21	Half-speed unit scan operating • When the half-speed unit does not trigger the half-speed unit home position sensor within a predetermined time.
22	No. 5/6 mirror unit scan operating • When the No.5/6 mirror unit does not trigger the No. 5/6 mirror unit home position sensor within a predetermined time.
23	F8-C02 miss-input (Measurement input for adjusting the original registration)
24 to 31	Not used
32	Auto original density detection • When the auto original density signal is not detected or the auto original density cannot be adjusted.

Code	Function/Cause
33 to 39	Not used
40	Optics cooling fan (A) motor • When the motor is operating, the motor signal is not detected ON/OFF or motor signal is detected ON/OFF during stops.
41	Optics cooling fan (B) motor (Option) • When the motor is operating, the motor signal is not detected ON/OFF or motor signal is detected ON/OFF during stops.

E2: Paper feed unit error

Code	Function/Cause
01 to 19	Not used
20	Sheet bypass paper pass sensor • When the sensor signal is not detected ON/OFF.

E3: Developer unit and Hopper unit error

Code	Function/Cause
01 to 02	Not used
03	Toner density sensor gain
04 to 09	Not used
10	High voltage power supply leak
11 to 19	Not used
20	Main motor rotation
21	Not used
22	Blacking prevention film
23 to 29	Not used
30	Discharge lamp

E4: Fuser unit error

Code	Function/Cause
01	Fuser warm-up • When the fuser temperature does not reach the predetermined level within a predetermined time.
02 to 09	Not used
10	Fuser cooling fan motor • When the motor signal is not detected ON/OFF or motor signal is detected ON/OFF during stops.

E5: System (+24V/+10V) error

Code	Function/Cause
01	Vp (+24V) line
02 to 03	Not used
04	Vo (+10V) line
05 to 34	Not used
35	EEPROM • Transmission and receiving line (Data, Latch, Clock signal) is defective.
36 to 41	Not used

6. Service mode

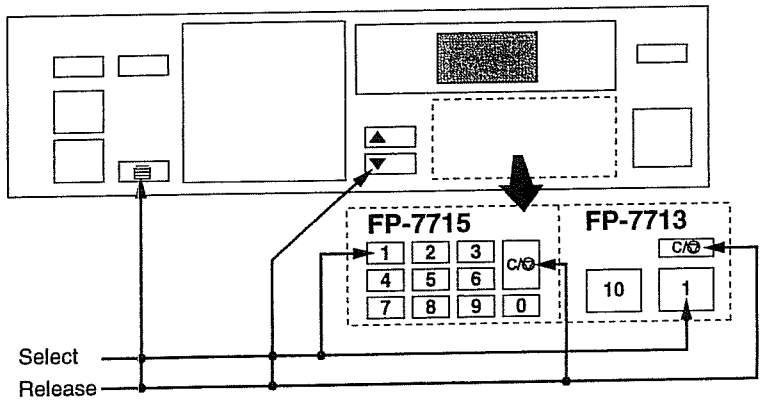
In Service Mode, the technician can check for abnormalities in the copier, The input/output of every section can be checked.

Select : Press the PAPER TRAY, ZOOM DOWN keys and MULTI-COPY key1 (FP-7715)/"1" key (FP-7713).

Release : Press the PAPER TRAY, ZOOM DOWN and CLEAR/STOP keys.

Note:
- If the copier is abnormal, then F4 will appear in the DIGIT display.
- If the copier is left in the "F" mode and shut off after servicing, it will still be in the "F" mode when the copier is turned ON again. The release program must be used to exit "F" mode.
- If the developer unit is not installed, a "UFX" (X = service mode you are in) will appear in the DIGIT display.

Caution: A high voltage hazard remains even when the machine is not operating. Always disconnect the machine from its power source (wall outlet) before servicing or disassembling.



Service mode key function:

Service mode	Item	Function
F1	Display check	Indicators and display check.
F2	Single sheet copying	For single copy operation.
F3	Continuous copying	For continuous copy operation.
F4	Input/Output check	The functioning of Input/Output items (selected item numbers) is checked.
F5	Copier function programming	Various function settings (selected by code numbers) can be changed.
F6	Adjustment and Programming	Various adjustment settings (selected by code numbers) can be changed.
F7	Electronic counter	Reads or Resets the electronic counter.
F8	Copier operating adjustment	Perform pseudo-operation of an item (selected by code numbers).

Note: Memory sheet for F5 and F6, RAM information is attached to the right cover.

F4 mode

Output check

Activate the left cover switch before executing output check.

Code	Item	Function	Remarks
20	Fuser cooling fan	The fan energizes when the PRINT key is pressed.	Visual check. • Press the CLEAR/STOP key to reset.
21	Optics cooling fan (A) and (B)*		
22	Full-speed unit solenoid	The solenoid energizes for 2 seconds when the PRINT key is pressed.	Visual check
23	Half-speed unit solenoid		
24	Not used		
25	Exposure lamp • To avoid light fatigue to the drum, remove the developer unit. • To prevent the temperature from rising, do not carry this out frequently.	The lamp turns ON for 2 seconds when the PRINT key is pressed.	

***NOTE:** Optics cooling fan (B)
FP-7713: option
FP-7715: Standard

Code	Item	Function	Remarks
26	Main motor (Discharge lamp, Developer bias and Fuser cooling fan)	The motor is energized when the PRINT key is pressed.	Visual check. • Press the CLEAR/STOP key to reset.
27	+24V ON	24V is generated when the PRINT key is pressed. **Note:** Connect meter between VP and GND on CPU PCB.	
28	Paper feed roller clutch	The clutch energizes for 2 seconds when the PRINT key is pressed.	Visual check.
29	Sheet bypass clutch		
30	Timing roller clutch		
31	Total counter	The total counter counts up when the PRINT key is pressed.	
32	Fuser lamp	The lamp turns ON for 2 seconds when the PRINT key is pressed.	
33	Paper feed roller clutch (Paper feed console) (FP-7715)	The paper feed roller clutch turns ON for 2 seconds when the PRINT key is pressed.	Visual check. • Press CLEAR/STOP key to reset.
34	Registration roller clutch (Paper feed console) (FP-7715)	The registration roller clutch turns ON for 2 seconds when the PRINT key is pressed.	
35	ADF main motor (forward rotation) (FP-7715)	The ADF main motor rotates forward when the PRINT key is pressed.	
36	ADF main motor (reverse rotation) (FP-7715)	The ADF main motor rotates in reverse when the PRINT key is pressed.	
37	ADF paper feed solenoid (FP-7715)	The solenoid is energized when the PRINT key is pressed.	

F5 mode copier function programming

	Code	Item	Function	(Factory setting)
System	00	Country version **Note:** When it is adjusted, turn the power switch OFF, then ON.	0: Japanese version 1: North American version 2: European version	1 (for America) 2 (for European)
	01	Frequency desired **Note:** When it is adjusted, turn the power switch OFF, then ON.	0: 50Hz 1: 60Hz	0 (for European) 1 (for American)
	02	Auto reset timer **Note:** When it is adjusted, turn the power switch OFF, then ON.	0: None 1: 30 seconds 2: 1 minute 3: 2 minutes	2
	03	Standby timer **Note:** When it is adjusted, turn the power switch OFF, then ON.	0: No standby 1: Standby (2 minutes) 2: Standby (4 minutes)	0
	09	Fuser lamp electronic starting control (When power ON)	0: Zero cross control 1: Phase control	0
	10	Optics cooling fan control **Note:** When it is adjusted, turn the power switch OFF, then ON.	0: Normal operation 1: Exposure lamp turns on time control	1
	11	Copy reservation function **Note:** When it is adjusted, turn the power switch OFF, then ON.	0: Not detecting 1: Detecting	1
	13	Power saving/ Condensation prevention mode **Note:** When it is adjusted, turn the power switch OFF, then ON.	0: None 1: 5 minutes 2: 10 minutes 3: 30 minutes 4: 60 minutes	0
	14	Power saving / Condensation prevention mode selection	0: Power saving mode 1: Condensation prevention mode	0

	Code	Item	Function	(Factory setting)
Optional machine	20	ADF (FP-7715)	0: Cancellation of ADF 1: ADF installation automatically discriminated (When the ADF signal cord is connected to the copier CPU PCB, the copier detects ADF automatically.)	1
	22	Paper feed console (FP-7715)	0: Cancellation of paper feed console 1: Paper feed console installation automatically discriminated (When the Paper feed console signal cord is connected to the copier CPU PCB, the copier detects paper feed console automatically.)	1
	24	Exposure lamp voltage for measuring constant light quantity	0: Not detecting (OFF) 1: Detecting (ON)	1
	33	ADF movement without original (FP-7715)	0: No movement without original 1: ADF movement without original by F2 mode, (Continuing movement)	0
	34	Background for drum compensation	0: No function 1: Exposure 1 step (0.2V) every 1,600 copies = Max. 38 steps 2: Exposure 1 step (0.2V) every 2,000 copies = Max. 30 steps 3: Exposure 1 step (0.2V) every 2,400 copies = Max. 26 steps	1
Counter	40	Double count (Total counter)	0: Single 1: Ledger/A3 size 2: Ledger/Legal/A3/B4 size	1
	41	Count up timing	0: At paper feed roller clutch 1: At paper exit sensor	1

	Code	Item	Function	(Factory setting)
Default	50	Auto original density (When power ON)	0: Not detecting 1: AUTO Mode priority 2: DOCUMENT Mode priority	2
	59	Copier operation (After toner hopper empty detection)	(Factory use only = Do not change this number.) 0: Copier stops or copy cycle is inhibited 1: Continuous copier operation	0
	60	Automatic cassette position selection	0: Not detecting 1: Detecting = When there is no paper in the cassette while the copy cycle, the cassette position of same size and direction selected automatically.	1
	63	U13 clear = After toner empty detection (Copier stops or copy cycle inhibited)	0: When clearing the U13, press any key. 1: Press PAPER TRAY key and 10 DIGIT key (FP-7713)/ 0 key (FP-7715).	0
	65	(Factory use only)		
Preventive maintenance	70	Preventive maintenance	0: No call 1: 1,000 copies 2: 2,000 copies 3: 4,000 copies 4: 16,000 copies 5: 30,000 copies	5

	Code	Item	Function	(Factory setting)
Paper size	81	Legal/Foolscap size selection (For European version)	0: B4 size 1: Foolscap (13" x 8") 2: Foolscap (13" x 8.5")	0
	83	Copy paper size setting (Copier)	0: The first sheet is copied with the largest copy paper size 1: When normally making copies, the size is determined at the time when the paper is in transit before copying 2: A3/Ledger 3: B4/Legal/Foolscap 4: A4/Letter 5: A4R/Letter R 6: A5/Invoice	4
	84	Copy paper size setting (Paper feed console)	0: The first sheet is copied with the largest copy paper size 1: When normally making copies, the size is determined at the time when the paper is in transit before copying 2: A3/Ledger 3: B4/Legal/Foolscap 4: A4/Letter 5: A4R/Letter R 6: A5/Invoice	4
	88	Paper size setting by user (FP-7715)	0: Yes 1: No	0
	89	Optics fan motor 2 error detection	0: Detecting 1: Not detecting	1

F6 mode Adjustment and programming

Code	Item	Function	Remarks
00	100% selection (Ratio of vertical position and parallel position to the paper feed detection) (Standard = 100.7%)	Adjustment from 99.1% to 100.9%	Ratio can be adjusted by 0.1% (–9 to +9)
01	Just 100% ratio (Ratio of parallel position to the paper feed direction)	Adjustment of ratio for parallel position to the paper feed direction.	Ratio can be adjusted by 0.1%. (–9 to +9)
02	100% focus	Adjustment of focus.	(–50 to +50)
03	Just 100% ratio (Ratio of vertical position to the paper feed direction)	Adjustment of ratio for vertical position to the paper feed direction. (+): Enlargement direction. (–): Reduction direction.	(–20 to +20)
04	Original registration detecting timing (Reduction and Enlargement copying)	Adjustment of original registration timing in reduction and enlargement. (+): Registration is delayed. (–): Registration is advanced.	Detection timing can be adjusted by 0.2 mm (–20 to +20) • If you adjust the content of C02 in F8 mode, the content of C04 in F6 mode is automatically changed from the factory setting.
05	Copy paper registration detection timing	After C04 is adjusted, delay time is adjusted from timing roller clutch ON. (+): Paper feed timing is delayed. (–): Paper feed timing is advanced.	Timing can be adjusted by 0.5 mm. (–18 to +20) • If you adjust the content of C02 in F8 mode, the content of C05 in F6 mode is automatically changed from the factory setting.
06	Not used	—	—
07	Registration void of image	After C05 is adjusted, registration void is adjusted. (+): Big (–): Small	Registration void timer can be adjusted by 0.5 mm.
08	Trail edge timing of image (Reduction)	With the original being Ledger/A3 size, adjustment is made for the trail edge that occurs when a 65% copy is made to Ledger/A3 size copy paper.	Trail edge can be adjusted by 0.5 mm. (–20 to +9)

Code	Item	Function	Remarks
09	Not used	—	—
10	Blacking prevention film home position	Adjustment of relation between the blacking prevention film home position and erase position.	0.56 mm (–99 to +99)
11	Exposure standard (standard - 62V for 120V, 124V for 220-240V)	Adjustment of overall exposure standard.	Exposure can be adjusted by 0.2V (for 120V)/0.4V (for 220-240V). (–99 to +99)
12	PHOTO Mode exposure voltage change (standard =+8.2V for 120V/–16.4V for 220-240V)	Adjustment of PHOTO Mode exposure voltage.	Exposure can be adjusted by 0.4V for 120V/0.8V for 220-240V. (–9 to +9)
13	Zoom exposure (Reduction) (65%) (standard=+4.7V for 120V/ –9.4V for 220-240V)	In reduction mode, the exposure voltage is adjusted in proportion to the difference between the reduction ratio and 100% ratio.	Exposure can be adjusted by 0.22V for 120V/0.44V for 220-240V. (–9 to +9)
14	Zoom exposure (Enlargement (141%) (standard=+5.4V for 120V/ +10.8V for 220-240V)	In enlargement mode, the exposure voltage is adjusted in proportion to the difference between the enlargement ratio and 100% ratio.	Exposure can be adjusted by 0.16V for 120V/0.32V for 220-240V. (–9 to +9)
15	Exposure voltage correction for measuring the constant light voltage	The exposure lamp voltage for measuring the light volume is corrected according to the output from the auto original density sensor.	Voltage can be adjusted by 0.2V for 120V/0.4V for 220-240V. (–99 to +99) • If you adjust the content of C03 in F8 mode, the content of C15 in F6 mode is automatically set.
16	Constant light volume exposure lamp voltage correction	When the power is switched ON, the C15 exposure lamp voltage is input to the auto original density sensor. If the auto original density sensor detection value differs from the standard density, the exposure lamp voltage correction is set. When a copy is made, this correction voltage is added.	Voltage can be adjusted by 0.2V for 120V/0.4V for 220-240V.(–99 to +99) • If you adjusted the content of C03 in F8 mode, the content of C16 in F6 mode is automatically set to "0"

Service mode

Code	Item	Function	Remarks
17	Grid standard voltage (standard = –820V)	Adjustment of grid standard voltage. (+): Dark (–): Light	Voltage can be adjusted by approx. –8.3V. (–44 to +16)
18	PHOTO Mode grid voltage (standard = –520V)	Adjustment of PHOTO Mode grid voltage. (+): Dark (–): Light	Voltage can be adjusted by approx. –8.3V. (–8 to +52)
19	Bias standard voltage (standard = –250V)	Adjustment of bias standard voltage. (+): Dark (–): Light	Voltage can be adjusted by approx. –8.3V. (–36 to +24)
20	Not used	—	—
21	Toner density sensor gain voltage (standard = 6V)	(Factory use only) Adjustment of toner density sensor gain voltage.	This adjustment should not be adjusted. • If you adjust the content of F8-C09, the content of F6-C21 will automatically change from the original factory setting.
22 to 25	Not used	—	—
26	Toner density sensor judgment voltage level (standard = 2.5V)	(Factory use only) Adjustment of toner supply starting judgment voltage level.	This adjustment should not be adjusted. • If you adjust the content of F8-C09, the content of F6-C26 will automatically change from the original factory settings.
27 to 30	Not used	—	—
31	Fuser temperature **Note:** When it is adjusted, turn the power switch OFF, then ON.	Adjustment of fuser temperature. (–): Temperature lowers. (+): Temperature raises.	Temperature can be adjusted by approx. 0.7° (–15 to +15)
32	Original density light peak of auto original density level	The level is adjusted in proportion to the ratio between the light peak level and standard level.	The level can be adjusted by 1%. (–99 to +99)
33	Original density average of auto original density level	The level is adjusted in proportion to the ratio between the average level and standard level.	

Code	Item	Function	Remarks
34	Original density (light/dark) contrast of auto original density	This level adjusts contrast by dividing the difference of the minimum and maximum original density by the standard density.	The level can be adjusted by 1%. (–99 to +99)
35	Not used	—	—
36	Registration of original for the ADF (FP-7715)	Adjustment of registration timing.	0.65 mm (–32 to +32)
37 to 40	Not used	—	—
41	Paper loop (Copier paper tray)	(Factory use only) This mode is used to adjust the length of the loop formed before the copier timing roller. (–): Loop length decreased (+): Loop length increased	This adjustment should not be adjusted. Loop can be adjusted by 2.5 ms. (–99 to +99)
42	Paper loop (Sheet bypass)		
43	Not used	—	—
44	Paper loop (Paper feed console) (FP-7715)	This mode is used to adjust the length of the loop formed before the paper registration roller of paper feed console.	2.5 ms. (–99 to +99)
45 to 51	Not used	—	—
52	Reduction mode focus	After C02 is adjusted, when the reduction mode is not in focus, this is adjusted.	(–9 to +9)
53	Enlargement mode focus	After C02 is adjusted, when the enlargement mode is not in focus, this is adjusted.	
54	Not used	—	—
55	Paper loop (Paper feed console) (FP-7715)	This mode is used to adjust the length of the loop formed before the copier.	2.5 ms. (–99 to +99)
56	Trail edge void of image (Copier paper tray)	This mode is used to adjust the trail edge void of image. (–): Void increased. (+): Void decreased.	Trail edge void can be adjusted by 0.5 mm. (–20 to +40)
57	Trail edge void of image (Sheet bypass)		

Code	Item	Function	Remarks
58 to 59	Not used	—	—
60	Fuser temperature for condensation prevention	Adjustment of fuser temperature for condensation. (–): Temperature lowers. (+): Temperature raises.	(–9 to +9)
61	Background for drum	To compensate for the background when there are drum changes, the exposure voltage is increased. (+): Exposure voltage increases. • Always input "0" when the drum is replaced. • When any number is input, F7-C43 (Drum counter) is cleared.	0.2V. (–9 to +38)
62	Toner density	This compensation is added to F6-C21 (Toner density sensor gain adjustment) to set toner density sensor gain voltage. (+): Do not set. (–): Set toner density to light.	0.133V. (–2 to +1)
63 to 98	Not used	—	—
99	Back up memory	Press PRINT key twice. • To clear the F6-all codes = 0 setting. • F5-C00-1 setting.	—

Service mode

F7 mode Electronic counter

Code	Item
21	Total count
22	Preventive maintenance total count **Note:** If more than 30,001 copies (ex.F5-C70-5: 30,000 copies) are input, the "---" will appear in the display.
23	Developer total count
24 to 42	Not used.
43	Drum counter **Note:** If more than 2,001 copies (ex. F5-C34-2: 2,000 copies) are input, the "---" will appear in the display.
44 to 98	Not used
99	Clear all counts

F8 mode Copier operation adjustment

Code	Item
00	Aperture plate for exposure lamp unit adjustment
01	Original registration adjustment copy
02	Measurement input for adjusting the original registration
03	Exposure lamp voltage for measuring constant light quantity • Perform this adjustment after replacing the auto original density sensor.
04 to 05	Not used.
06	Machine error and Paper jam read (This function checks the content of machine error and paper jam)
07	Machine error and Paper jam code read clear
08	Lock operation of full-speed unit, half-speed unit and No.5/6 mirror unit
09	Automatic gain adjustment of toner density sensor • This adjustment must always be performed when replacing developer.

Service mode